



REPORT ON ANALYSIS OF GENERAL EDUCATION, TTCS, AND TVET NATIONAL EXAMINATION RESULTS FOR (2019–2022)

**By
National Examination and School
Inspection Authority**

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FOREWORD

Education is one of the main pillars upon which Rwanda's socio-economic development hinges. For nearly the past three decades, Rwanda has registered progressive improvement in education in terms of access, quality and equity. In a bid to make education more relevant to national aspirations of becoming a knowledge-based economy, a competence-based curriculum was introduced. In view of this, national examinations are administered at the end of each learning cycle (Primary 6, senior 3, senior 6 for general basic education, level 5 of Technical and Vocational Education and Training (TVET) and end of year 3 for TTCs) to assess the attainment of intended curriculum competences to inform decision making and education system management.

As such, National Examination and School Inspection Authority (NESA) was established with a prime mission of ensuring quality of education in basic education and Technical and Vocational Education and Training (TVET) from level one (1) to five (5) and to regulate the comprehensive assessments of students and national examinations.

Accordingly, NESA conducted an analysis of national examination results to establish the trend of learners' performance and pass rate to inform improvement pathways in teaching, learning and assessment. The analysis covered all the subjects examined in 2019, 2021, and 2022 school years.

On this note, NESA presents a report of the analysis of the national examination results for each subject or trade at each level. The report highlights the general pass rate and performance, pass rate disaggregated by gender, school location (rural and urban), school ownership (public, private and government aided) and school status (boarding/day school) for each subject.

It is hoped that this report provides a general picture of learners' achievement at the end of the respective learning cycles, and informs education stakeholders of areas for intervention.

We express our sincere gratitude to the World Bank for the financial support and everyone who contributed to the successful compilation of this report.

Sincerely,

Dr. BAHATI Bernard

Director General

National Examination and School Inspection Authority (NESA)

ACRONYMS AND ABBREVIATIONS

ACC	Accounting
AES	Auto Electricity and Electronic Systems
ANH	Animal Health
ATC	Automobile Transmission and Control Systems
BUC	Trade
BUS	Business Services
CAP	Carpentry
CBC	Competency Based Curriculum
CCTV	Closed Circuit Television
CPPE	Creative Performance and Physical Education
CPR	Crop Production
CRP	Crop Production
CTO	Customs and Taxation Operations
CUA	Culinary Arts
CV	Coefficient of Variation
DBMS	Database Management System
DCG	Design & Construction Guidelines
ELS	Electronic Service
FBS	Food and Beverage Services
FOB	Football
FOE	Foundation of Education
FOECE	Foundations of Early Childhood Education
FOP	Food Processing
FOR	Forestry
FPO	Food and Beverage Operations
GA	Government Aided school
GE	General Education
GSM	General Sciences and Mathematics
HPE	Hydropower Energy
IEL	Industrial Electricity
IND	Interior Design
LAN	Local Area Network

LSV	Land Surveying
MAS	Masonry
MLM	Computer Applications and Multimedia
MPT	Mechanical Production Technology
MUS	Music
NA	Not Applicable
NESA	National Examination and School Inspection Authority
NET	Networking
NM	Numeracy and Mathematics
OFM	Office Management
P6	Primary six
PLB	Plumbing
PR	Private school
PU	Public School
RCT	Road Construction
REB	Rwanda Education Board
RTB	Rwanda TVET Board
RF	Radio Frequency
S3	Senior three
S6	Senior six
SCE	Ceramics & Sculpture
SD	Standard Deviation
SEN	Solar Energy
SMAW	Shielded Metal Arc Welding
SOD	Software Design
SPE	Software Programming and Embedded Systems
SPIU	Single Project Implementation Unit
SPSS	Statistical Package for the Social Sciences
TAL	Tailoring
TEL	Telecommunication
TRS	Tourism
TTC	Teacher Training College
TVET	Technical and Vocational Education and Training
VC	Variation Coefficient
WEL	Welding

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EXECUTIVE SUMMARY

Analysis of student national examinations helps to determine the extent to which the curriculum learning outcomes have been achieved and to identify areas where they perform well and those that need improvement. This report presents results of the analysis of national examinations for end of primary six, end of Ordinary level, end of advanced level, end of level 5 of Technical and Vocational Education and Training (TVET), and year three of teacher training colleges for three consecutive school years (2019, 2021 and 2022). The objectives of the analysis were twofold: 1) to compare the pass rate of students in the old and the new grading system, and 2) to identify subjects that require intervention in terms of teaching, learning & assessment to improve student's performance in the future.

Student performance in 2022 was analyzed based on the revised grading system in comparison with the performance in previous years, that is, 2019 and 2021. The analysis highlights the achievement level of learners, thus identifying their strengths, weaknesses, and gaps in the teaching and learning process in schools in Rwanda. The initiative of analyzing national examinations for primary six, lower secondary level, upper secondary level, Teacher Training Colleges (TTCs) and Technical and Vocational Education and Training (TVET) has been inspired by other countries in the region such as Kenya, Uganda, Ghana and South Africa where analysis of national examinations is conducted and elicits valuable information for informed decision making by policy makers as well as informing education supervisors at various levels.

Accordingly, the analysis began with collecting, organizing and synthesizing results of students in all national examinations for 2019, 2021, and 2022 as well as views of teachers. The results were retrieved from National Examination and School Inspection Authority (NESA) examination data base, national examination guidelines, chief markers' reports produced during marking of national examinations, and teachers' views during focus group discussions regarding national examination performance. Results of students were entered into SPSS version 20, Stata14, Access, and excel for easy tabulation, analysis and interpretation. Students' results were processed, categorized, coded, and analyzed. Descriptive statistics (measures of central tendency and variability) were used to analyse and interpret the findings. Charts, frequency tables, and cross tabulations were generated. Data on student performance was categorized and presented according school ownership (private, government aided and public schools); gender; school location (districts and provinces, rural and urban); and school status (boarding and day schools). The subjects for which the national exam results were analysed at every level include: Primary level (5), O-level (9), A-level (14 subject combinations), TTCs (18 subject combinations) and TVET 34 trades (216 subjects).

Key findings

Overall, results from the analysis of national examinations for each learning cycle show that the pass rate of students in all the examinable subjects in 2022 (when the revised grading system began) was relatively higher than in the previous two years (2019 and 2021) in the old grading system. This suggests that the revised grading system did not negatively impact on the pass rate of students.

The pass rate of students in national exams in the three years (2019, 2021 and 2022) varied according to the learning cycle/level, subject, gender, school ownership and type of school (boarding and day), among others. However, it should be noted that for A-level, TTC, and TVET, there was no consistency in the pass rate between male and female students over the three years. While pass rates among female students were generally higher than male in some subject combinations and trades, they were lower in others.

At primary school level, the pass rate in private schools was relatively higher than in public and Government aided school. However, in 2022, in which the revised grading system began, the pass rate was relatively higher than in the two previous year (2019 & 2021). Specifically, in 2019 and 2021 the pass rate stood at 81.6% and 81% respectively while in 2022, it increased to 90.69%. Disaggregated by gender, the pass rate of girls was relatively higher than that of boys. Overall, Kinyarwanda had the highest pass rate across all three years and Mathematics had the lowest. The pass rate in rural schools was relatively lower than the pass rate in urban schools in 2021 and 2022. On average, the pass in 2021 was 75.12% in rural schools and 86.90% in urban while in 2022, it was 82.08% in rural schools and 89.48% in urban.

With respect to O-level, students' pass rate in all the subjects examined was relatively consistent over the three school years. It stood at 86.6% in 2019, 86.3% in 2021 and 85.7% in 2022. When disaggregated by gender, the trend of pass rate was similar, but the pass rate among girls was relatively higher than boys. The average pass rate for all the examined subjects at O-level significantly increased over the three years. It rose from 56.8% in 2019 to 67.1% in 2021 and to 93.3% in 2022. It is worth noting that while there was a substantial increase in the pass rate in all the examinable subjects across the three years, Mathematics subject remained having the lowest pass rate. The highest pass rate in each of the three years was observed in Kinyarwanda. In contrast to primary school leaving exams in which the pass rate among girls was predominantly higher than boys across the three years, in O-level exams, the pass rate among boys in all exams was relatively higher than girls in the three years.

For A-level, the general pass rate of candidates who sat for national examinations varied. In 2019, it stood at 89.5% and reduced to 85.3% in 2021. However, in 2022, it sharply rose to 94.6%. Among the core combination subjects for humanities, the highest average pass rate was in Kiswahili (87.8%) and the lowest in French

(74.56%) across the three school years. Similarly, for science core combination subjects, Biology had the highest average pass rate (91.58%) while Mathematics had the least average pass rate (66.76%). General Studies and Communication Skills, which is a non-core subject had the overall highest pass rate in the three years (2019, 2021 & 2022). With respect to gender, the pass rate of male students was relatively higher than that of female students in all the A-level examined subject combinations. In addition, for A-level, type of school (boarding and day) was considered and it was found that, in general, the pass rate in boarding schools was relatively higher than day.

Regarding TTCs, the pass rate in year three TTC national examinations was relatively consistent over the three school years considered (2019, 2021 and 2022), with no significant difference across the years. In 2019, the proportion of students that passed was 98.2% while in 2021 and 2022 it stood at 99.7% and 99.9% respectively. Nonetheless, there were variations in pass rate in the examined TTC subjects over the three years. The subject with lowest average pass rate was French (37.5%) while Foundations of Education, Mathematics, Entrepreneurship, Teaching practices, English, and Kinyarwanda had the highest average pass rate (over 95%). It is worth noting that the pass rate in some subjects was 100%. This was evident in 2022 in subjects such as English, Kinyarwanda, Integrated Sciences and Entrepreneurship.

The pass rate in other TTC subjects in 2022, when the revised grading system started was generally outstanding ranging from 94% in Chemistry to 100% in Economics, Geography, History, and Creative Performance. In fact, the average pass rate was 98.80%. There was no significant difference in pass rate between female and male students in other TTC subjects. For instance, in subjects such as Creative Performance (Music & Fine Arts), Economics, Geography, History, Religious Education, Social Studies, and Teaching Methods, the pass rate of female and male students was either the same or very close to each other.

With respect to TVET, there were 34 trades in all the three years (2019, 2021 and 2022), and each trade consisted of 6–10 subjects in which students were examined at national level. Overall, the pass rate in TVET trades national examinations across the three years was very good. In 2019, the general pass rate was about 91% and in 2021 and 2022, it increased at nearly the same rate, that is, 97% and 98 % respectively. Another trade of Software programming and Embedded Systems was introduced in 2022, with 17 subjects and the pass rate in 16 of them was 100%, while in the other trade it stood at about 88%. The trades with the highest average pass rates across the three years were: Graphics Art trade (99%), Ceramics and Sculpture trade (99%), Interior design trade (98%), and Welding (98%). The lowest pass rates were observed in Food and Beverage Services trade (70%), Customs and taxations operations trade (76%) and accounting trade (76.7%). In addition to the trades, the results of 6 cross cutting subjects were also analysed and the highest pass rate was in Kinyarwanda (97%) while the lowest in Kiswahili (24%).

In a nutshell, there was a progressive improvement in performance in national examinations for primary, O-level, A-level, Teacher training colleges as well as TVET trades over the three years. In fact, in 2022, the general pass rates of students in exams at all levels were significantly higher compared to 2019 and 2021. The implication is that the new grading system had no impact on student failing or passing. Despite the progressive improvement in general performance at different levels, as earlier mentioned, in some subjects and trades, the performance was poor and there were variations, especially pertaining to location (rural-urban), ownership of school (public, district, private and government aid) and gender. Based on the findings of the analysis, the following recommendations are made:

- NESAs should have a long-term plan for adopting and implementing this practice every year. Also, NESAs should plan so that in future, end term III exam results are also analysed and comparison made with national exam results to provide a clear picture of student performance. It can also help teachers to evaluate the effectiveness of their teaching strategies.
- NESAs, in collaboration with partners should conduct a comprehensive study to identify the factors that have contributed to disparities in performance by location, gender, district and school ownership. The findings of the study could serve as the basis for development of evidence-based strategies that can enhance the quality of teaching and learning thereby addressing disparities between provinces, rural and urban schools. The study can also unveil best practices in high-performing districts, and schools that can be adopted and implemented by those that perform poorly.

SECTION ONE: INTRODUCTION

1.1. Background and Rationale for Analysis of National Examinations

Improving student learning outcomes is one of the key priorities for the Ministry of Education. Valid and reliable measures of student learning outcomes are important components in the drive for improvement in teaching and learning process. Improvement of student learning achievement depends among other factors on effective implementation of education policies at classroom level. Accordingly, in a bid to improve the quality of education and to advance Rwanda's agenda to become knowledge-based economy, the ministry of Education initiated some strategies to ensure that effective teaching and learning take place and due competences are acquired by learners. Among the strategies employed is conducting the national examinations at the end of each cycle; Primary, Lower secondary, Upper secondary, year three of TTC and level five of TVET.

Assessment of student learning (summative assessment) through administration of national examinations is emphasized by the Presidential Order No 121/01 of 15/10/2020 establishing National Examination and School Inspection Authority (NESA) as part of the government's efforts to improve the quality of education in Rwanda.

NESA has the onus of overseeing and regulating national examinations. It is also responsible for developing and administering national examinations, such as end of term II exams, the Primary Leaving Examination (PLE), the Ordinary level national examinations, the Advanced Level national exams, and TTC national exams as well as ensuring that schools are providing quality education to students by conducting regular inspections to assess their performance and adherence to the standards. In fact, national examinations as provided for in the 2015 National Curriculum framework which recognizes competency-based assessment as a means of ensuring that students acquire the necessary skills, knowledge, attitudes, and values to succeed in the modern world. The curriculum frame work also places emphasis on alignment of the examinations with the content and the learning outcomes described in the subject syllabi, as well as putting special attention to standardization of scores and grading.

National examinations characterise most educational systems the world over and are the basis for awarding certificates to students who have completed a learning cycle as well as selection and orientation of students for studies at a higher level. National examinations act as a yardstick that enables teachers, School leaders, and parents and other education stakeholders to judge the attainment of curriculum learning outcomes as well as effectiveness of its implementation.

In Rwanda, national examinations are taken by candidates at the end of the primary level, lower secondary level and upper secondary level of Basic Education, Teacher Training College (TTC), and Technical and Vocational Education and Training (TVET). The number of examinable subjects in national examinations for each learning cycle are as follows: five (5) at Primary, nine (9) for lower secondary; fourteen (14) for upper secondary; eighteen (18) for TTC and two hundred sixteen (216) for TVET. In actuality, the analysis of national examination results is in line with the National Strategy for Transformation (NST) in Rwanda, which emphasizes the importance of quality education as a key driver for the country's development. The strategy identifies education as a priority sector and highlights the need to improve the quality of teaching and learning process.

Moreover, the initiative of analyzing national examinations for primary six, lower secondary level, upper secondary level, TTCs and TVET has been inspired by other countries in the region such as Kenya, Uganda, Ghana and South Africa where national examinations analysis is conducted and elicits valuable information for informed decision making by policy makers as well as informing education supervisors at various levels.

An overview of the old national examinations grading system in Rwanda

Before 1998, grading of candidate results in national examinations was based on percentages which relied on the 100-point scale (0-100). From 2007 to 2021, the grading system was changed to numerical grades (1 – 9), where 1 is the highest and 9 the lowest. In this kind of grading system, raw data (marks) were being converted into numerical grades as follows: Grades 1 and 2 are passes with distinctions; grades 3,4,5 and 6 are passes with credit; grades 7 and 8 are merely passes while; grade 9 indicates Unclassified or a Fail. The grades obtained by a candidate in all the subjects are added to form grade aggregate. Annex 1 provides a summary of the achievement description, percentage score ranges, grades and value used from 2007 to 2021 school year.

Revised national examination grading system

The grading consists of a 7-point scale expressed in both numerical and letter grades reflecting the candidate's level of achievement in each subject. The scale has 7 descriptors: 'Excellent', 'Very good', 'Good', 'Satisfactory'; 'Adequate'; 'Fair' and 'Fail'. The new harmonized and simplified grading indicates the achievement descriptions for each level of achievement, the grade boundary, the associated letter grades (A, B, C, D, E, S, F) and numerical grades (6, 5, 4, 3, 2, 1, 0). Annex 2 summarizes grades ranges corresponding grades letters, Grades Values, and description used in 2022.

Subsidiary subjects are graded by S or F, with S ranging from 40 Marks to 100 Marks and F ranging from 0 marks to 39 marks. The letter grade S has numerical value of 1 and the letter grade F has numerical value 0. TVET and Professional practical examinations, Integrated Assessments, Teaching Methods and Practice, Accounting practice and Clinical attachment and practice are graded by A ranging from 70 Marks to 100 Marks and F ranging from 0 to 69 marks. The letter grade A has numerical value of 6 and the letter grade F has numerical value 0. However, NESA reserves the right to review grade boundaries when deemed necessary.

At primary, there are 5 examinable subjects that are graded in national examinations and only the grade value for each subject is considered (0 to 6). The minimum aggregate is 0 and the maximum aggregate is 30. At O-level, there are 9 examinable subjects. Only grade value for each subject is considered (0 to 6) and the minimum aggregate is 0 while the maximum aggregate is 54. With respect to advanced level national examination (A-level for basic education and TTCs), the grading is done based on combination and options. Both grade letter and grade value are considered in addition to subject weighting. The minimum aggregate is 0 while the maximum aggregate is 60.

In view of the above background, for the first time in Rwanda, the National examinations and School Inspection Authority conducted an analysis of the national examinations results to assess students' pass rate in 2022 based on the new grading standards in comparison with the pass rate in previous years; 2019 and 2021. This will inform decision makers of the areas that need intervention to improve students' performance in national examinations. The analysis will also help to find out the achievement level of learners, thus tracking their strengths, weaknesses, and gaps in the teaching and learning process in schools in Rwanda.

1.2 Significance of national examination results analysis

The results from the analysis are important to the Government of Rwanda in general, the MINEDUC, education policy implementing agencies including NESA, REB, RTB, and other education stakeholders. In particular, the results will inform NESA and other education sector actors of examinable subjects that need more attention in teaching, learning and assessment.

The analysis of results will further guide NESA in improving Question Item Banks (QIB) and implementation of assessments in reference to the assessment standards and benchmarks. The results of this analysis will inspire research on student performance and assessment to inform educational policy and practices.

The findings and recommendations from the analysis will serve as a basis for decision makers and other education stakeholders to make their future contribution in improving teaching, learning, assessment and ultimately student performance. The feedback from this analysis will inspire teachers to identify the underlying factors affecting students' performance and their role in enhancing students' performance in their subjects.

1.3 Objectives of national examination results Analysis

The purpose of this analysis was to examine students' performance in National Examinations in all examinable Subjects for basic education learning cycles (P6, S3 & S6) and year 3 of TTC and TVET level 5 in the past three school years (2019, 2020/2021, and 2021/2022).

Specific objectives:

The following were the specific objectives of the study:

1. To compare the pass rate of students in the old and the revised grading system.
2. To identify subjects that require intervention in terms of teaching, learning & assessment to improve student's performance in the future.

1.4 Scope of the analysis

This analysis focused exclusively on students' performance in all the examinable subjects in national examinations at the end of the learning cycles in basic education and year 3 in TTCs in three school years (2019, 2021 and 2022).

SECTION TWO: METHODOLOGY

This section presents the procedure of data analysis, sources of data, methods and tools of data collection, processing and interpretation, and data presentation. The process of analyzing students' results in national exams began with collection of students' results in national examinations for the three years (2019, 2021, and 2022) and organizing them. Data entry into SPSS version 20, Stata 14, Access, and excel was done for easy tabulation, analysis and interpretation. Students' results were processed, categorized, coded, and analyzed. Descriptive statistics (measures of central tendency and variability) were used to analyse and interpret the findings. Charts, frequency tables, and cross tabulation were generated using SPSS version 20, Stata 14, Access and excel.

Students' results were retrieved from NESA examination data base, national examination guidelines chief markers' reports produced during marking of national examinations, and teachers during focus group discussions regarding national examination performance. Data on student performance was categorized and presented according to school ownership (private, government aided and public schools); gender; school location (districts and provinces, rural and urban); and school status (boarding and day schools).

It should be noted that while interpretation of standard deviation is dependent upon the context and nature of dataset, in this report, interpretation of the standard deviations and variation coefficients of scores for various subjects were based on the American Psychological Association (APA)¹ guidelines for reporting statistical results, which recommends that a standard deviation that is less than one-third of the mean can be considered a small variation, while a standard deviation that is greater than or equal to one-third of the mean can be considered a large variation.

¹ American Psychological Association. (2020). Publication manual of the American Psychological Association (7th ed.). <https://doi.org/10.1037/0000165-000>

SECTION THREE:

FINDINGS AND INTERPRETATION

This section presents the findings of the national examination results analysis for basic education learning cycles (P6, S3, & S6), year 3 of TTCs and TVET for 2019, 2021 and 2022. According to Rwanda's national curriculum framework, each cycle has a specific number of subjects that are examinable in national examinations. At primary school level there are 5 subjects while at O-level there are 9 subjects. At A-level 14 subjects are examinable and they are distributed in 15 combinations out of which a student pursues a four-subject combination plus a subsidiary. Similarly, in TTCs, there are 18 subjects distributed in 4 options. With respect to TVET, analysis was done in 34 trades and each had 6-10 subjects in which students were examined at national level over the three years. In 2022, one more trade with 17 subjects was introduced. In addition, exam results of 6 cross cutting subjects were also analyzed.

3.1. Analysis of National Primary examination Results for 2019, 2021 and 2022

This section presents findings from the analysis of primary examination results of each examinable subjects. It highlights the general pass rate and performance, pass rate by gender, by location (district, province, and rural-urban divide), by school ownership for three years (2019, 2021 and 2022). The grades upon which the pass rates were determined based on the old and new grading system are in Annex 1 (old grading system) & Annex 2 (revised grading system).

3.1.1 Primary Six Pupils' General Pass Rates in National Examinations for 2019, 2021 & 2022

The table below presents the total number of primary school pupils registered in 2019, 2021 and 2022, those sat for national exams as well as the number and percentage pass rate in the three years.

Table 1: General Pass Rates in all the national examinations for Primary Six

Year, number of students & Percentage						
	2019	%	2021	%	2022	%
Registered for national exam	286,721	100%	255,930	100%	230,158	100%
Candidates who sat for all national exams	278,456	97.1%	250,453	97.9%	227,720	98.9%
Candidates who passed	227,264	81.6%	207,315	82.8%	206,286	90.69%

The table above illustrates the overall pass rates of primary Six students in the national examinations over a span of three years (2019, 2021, and 2022). According to the table, there was a slight decrease in the total number of registered candidates from 286,721 in 2019 to 250,453 in 2021 and to 230,158 in 2022. While the number of candidates who sat for all exams also decreased over the three years, that is, from 278,456 in 2019 to 227,720 in 2021 and to 250,453 in 2022.

In terms of the pass rates in the national examinations, the data in the table shows that it was generally high. The pass rate in 2019 stood at 81.6% but slightly increased to 82.8% in 2021. However, in 2022, the pass rate significantly increased to 90.69%. This suggests a substantial improvement in student's performance during the national examination, particularly in 2022 when the new grading system was implemented. To explore the potential factors contributing to this improvement, an investigation can be undertaken.

3.1.2: General pass rate in Primary Mathematics national examination

Primary school pupils' general pass rate in mathematics national exams in three years were analysed and the findings are presented in Figure 1 below.

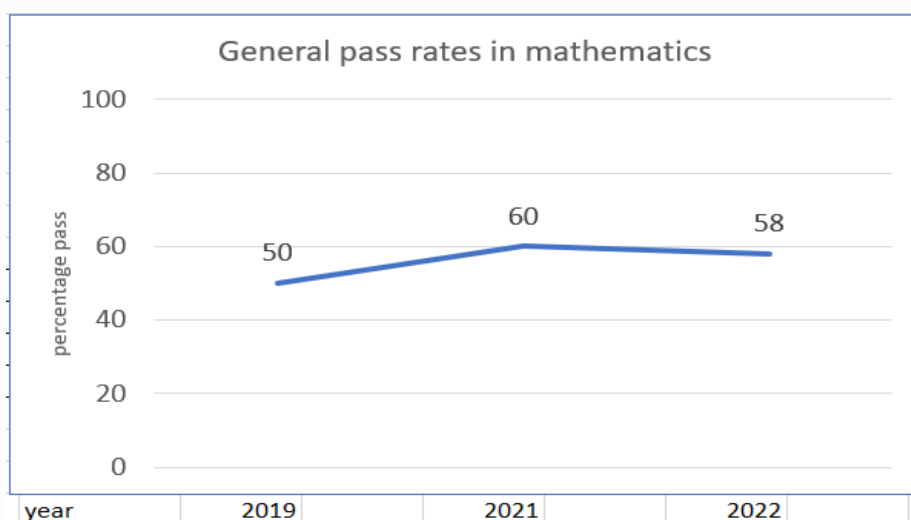


Figure 1: General pass rates (%) in mathematics for three school years

Figure 1 shows the trend of general pass in mathematics over a three-year period. The percentages of students who passed mathematics in 2019, 2021, and 2022 were 50%, 60%, and 58% respectively. There was a considerable increase in the pass rate in 2021 and 2022 compared with 2019, though in 2022 it dropped by 2 %. However, despite the substantial increase, it is evident that a considerable proportion of pupils had difficulty in mathematics and did not attain the required scores for pass and therefore more effort is required in future to increase the pass rate in Mathematics.

3.1.3 Pass Rates in Mathematics according to Gender

Primay six pupils' pass rate was analysed according to gender as depicted in Figure 2 below.

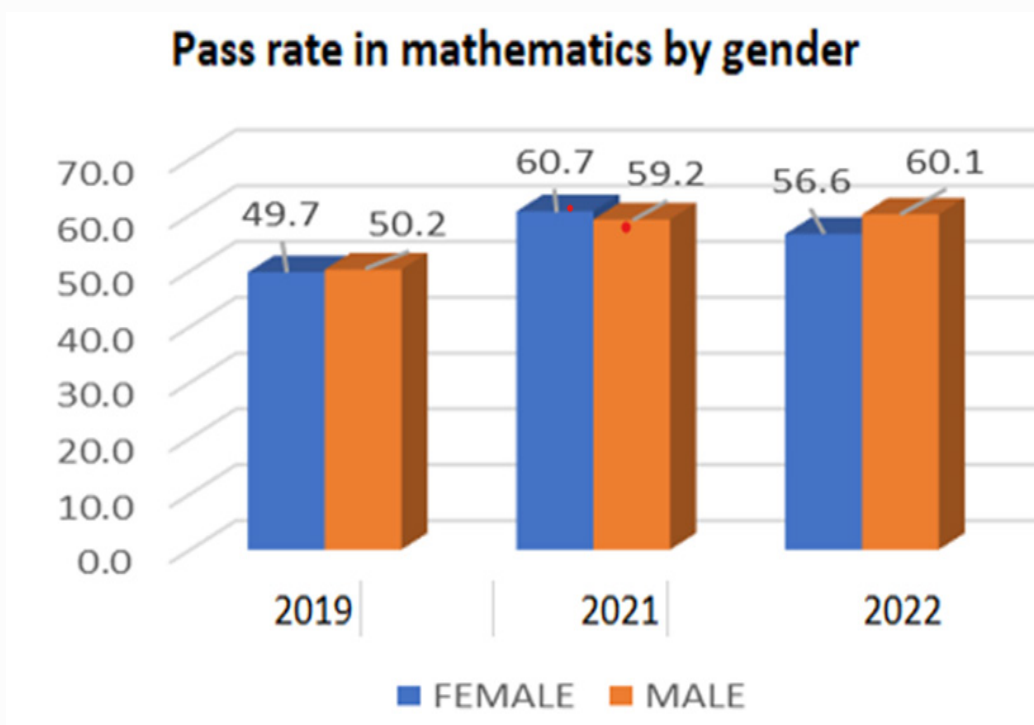


Figure 2: Pass rate in mathematics by gender

Figure 2 provides data on the pass rate of primary six pupils in Mathematics by gender for the years: 2019, 2021, and 2022. In 2019 and 2021 the pass rate for females and males in Mathematics was nearly the same. However, in 2022 the pass rate among male pupils was slightly higher than that of female. the pass rate for females in Mathematics decreased by 4.1% while for males, it increased by 0.9%. Overall, there was no significant difference in pass rate in Mathematics national exams between female and male pupils over the three-year period, but there was a substantial increase in the pass rate in 2021 and 2022 compared to 2019.

3.1.4 Mean, SD and VC of scores in P.6 national mathematics exam

In order to get a clear picture of pupils' performance in mathematics national exams across the three years (2019, 2021 and 22), the mean, standard deviation and variation coefficient were computed and the table below provides detail.

Table 2: Mean, standard deviation and Variation Coefficient of Mathematics exam results

	2019	2021	2022
Mean	14.53	20.7	21.64
Standard deviation (SD)	15.35	21.32	19.6
Variation Coefficient (VC)	105.62	102.98	90.6
Number	280,765	250,387	227,317

As evidenced by the mean scores, pupils' performance in mathematics national exams was generally poor across the three years, despite a slight increase in the mean scores in 2021 and 2022. The Standard Deviations (SD) and Variation Coefficients (VC) also show that individual pupils' scores were highly spread out around the mean (large variability), especially for 2019 and 2021. However, it is worth noting that the variation coefficient (VC) noticeably reduced in 2022. This means that there was a reduction in the spread of pupils' scores relative to the mean, hence slight improvement in performance.

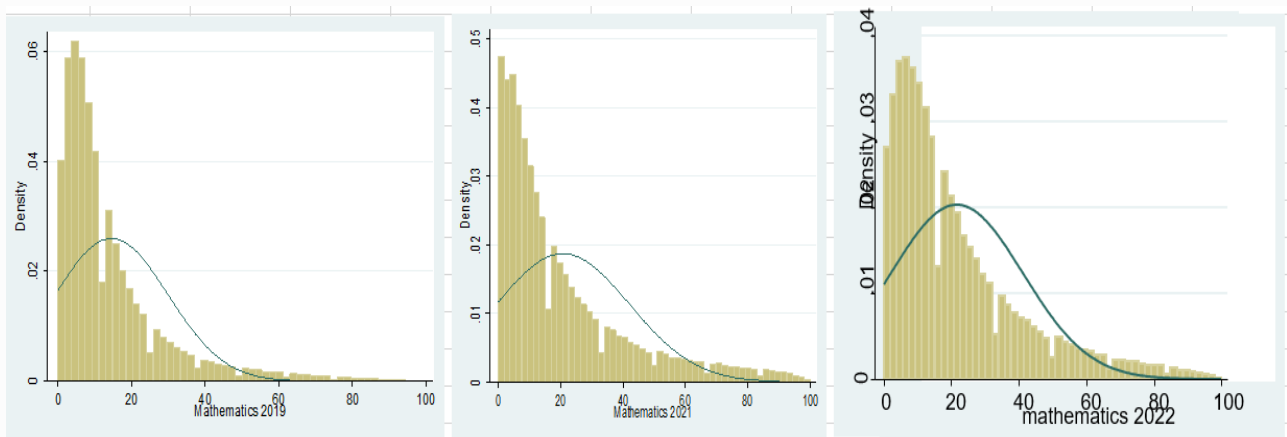


Figure 3: Distribution of Scores in Mathematics Subject

Figure 3 shows the distribution of scores in Mathematics for the years 2019, 2021, and 2022. The distribution curves for all the years are right skewed with majority of the scores spread on the left sides of the curves, which indicates that, in general, most of pupils scores were below the mean scores (14.53 & 20.7). There were a few scores above the mean scores, but with high variability relative to the mean. According to the Chief markers report and the response from the focus group discussions with teachers, the factors that might be attributed to poor performance in mathematics include classroom size, drop up, language barrier, poverty, lack of teaching & teaching materials, family conflict, learners'/students' indiscipline.

However, in 2022, there was a slight improvement as the curve is slightly less spread out (narrower) than in 2019 and 2021.

3.1.5 Pass rates in primary Mathematics exam by location

The analysis also considered on pupils' pass rates in mathematics by location, that is, by province, district, and rural and urban divide. The figure below shows the pass rate by province.

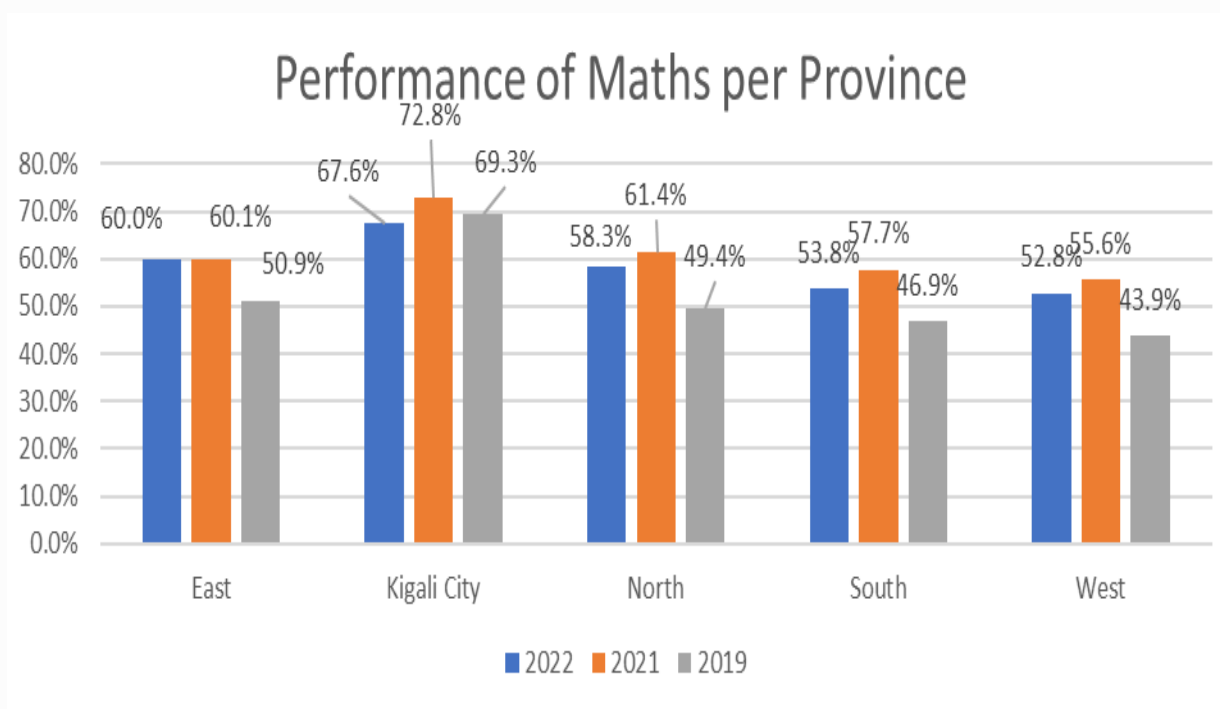


Figure 4: Pass rate in Mathematics by Province

Figure 4 shows that over a period of three years (2019, 2021, and 2022) Kigali City had the highest percentage of pupils who passed Mathematics followed by East province. The Western province emerged the last followed by the Southern across the three years. This calls for concerted efforts to increase the general pass rate in mathematics national exams in all the provinces, but with more emphasis in the western province.

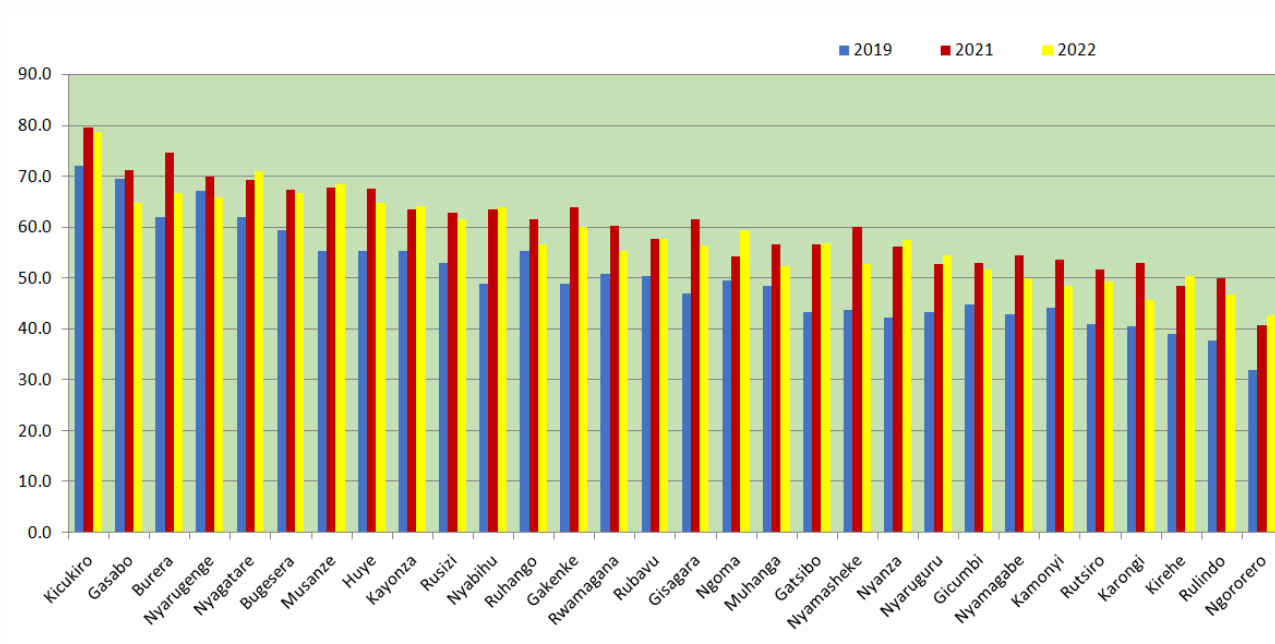


Figure 5: Mathematics Pass rate distribution by district

Figure 5 reflects the district pass rates in mathematics subject for the years 2019, 2021, and 2022. It is observed that there is a significant variation in pass rates among districts in all three years. Kicukiro district consistently had the highest percentage of students who passed mathematics in all three years, with 72%, 79%, and 79% in 2019, 2021, and 2022, respectively. In 2021 all districts had better pass rates than in the previous year (2019). It is worth noting that some districts namely: Nyagatare, Musanze, Kayanza, Nyabihu, Ngoma, Gashyamba, Nyanza, Nyaruguru, Kirehe, and Ngororero have had consistent improvement in mathematics pass rates while others declined as indicated by had lower pass rates in 2022 than in 2021.

Though Ngororero district consistently had the lowest percentage of pupils who passed mathematics over the three years, the trend of pass rates for the district (31.9% in 2019, 40.7% in 2021 and 42.6% in 2022) indicates high hopes for even further improvement in future. This expresses the need for interventions to sustain improvement and uplift mathematics teaching and learning.

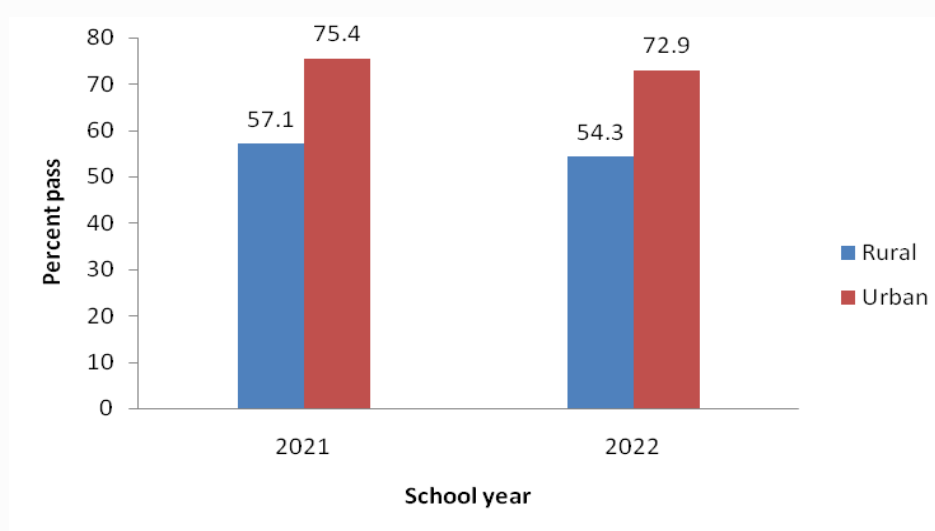


Figure 6: Mathematics pass rate distribution by location

Figure 6 shows the pass rates for mathematics for rural and urban areas over the last two academic years; 2021 and 2022. In 2021, the pass rate for mathematics in rural areas was 57.1%, while in urban areas it was 75.2%. This indicates that pupils in urban areas performed significantly better in mathematics than those in rural areas. In 2022, the pass rate for mathematics in both rural and urban areas decreased, with the pass rate in rural areas dropping to 54.9% and the pass rate in urban areas dropping to 73.5%. Despite the decrease, pupils in urban areas still performed better than those in rural areas, with a difference of 18.6% in pass rates. This suggests that there are challenges to teaching and learning more peculiar in rural schools than to schools in urban settings. Further investigation and interventions are needed to address these disparities and improve educational outcomes for pupils in both urban and rural areas.

3.1.6 Pass rates in primary Mathematics by school ownership

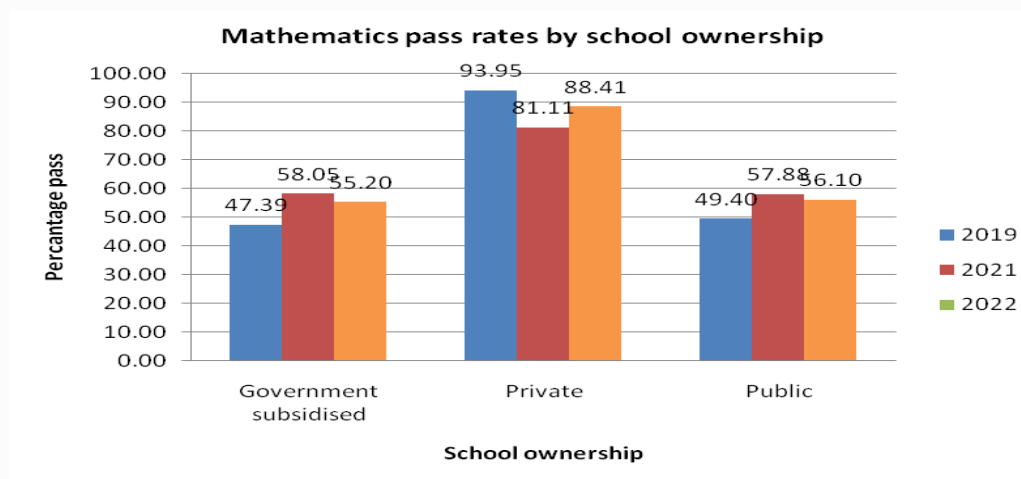


Figure 7: Pass rates in Mathematics by school ownership

Based on data in Figure 7, it is clear that pass rates in Mathematics varied according to school ownership. In 2019, the highest percentage of pupils who passed Mathematics was in private schools with 94%, followed by government-aided schools with 47%, and public schools with 49%. In 2021, private schools still had the highest percentage of pupils who passed Mathematics, but the percentage decreased to 81%. Government-aided schools had an increase in the percentage of pupils who passed Mathematics to 58%, and public schools had a slight increase to 56%. In 2022, private schools had the highest percentage of pupils who passed Mathematics with 88%, followed by government-aided schools with 55%, and public schools with 56%. Overall, it can be concluded that private schools have consistently performed better than government-aided and public schools in Mathematics, although government-aided schools have shown some improvement over the years.

3.1.7 Pass rates in Kinyarwanda subject in national examinations

In analyzing pupils' national results in Kinyarwanda, focus was put on the general pass rates, pass rates by gender, by location, and by ownership.

3.1.8 General Pass rates in Kinyarwanda subject in national examinations

Primary school students' general pass rate in Kinyarwanda was computed based on the percentage of students who passed the examination as presented in Figure 8.

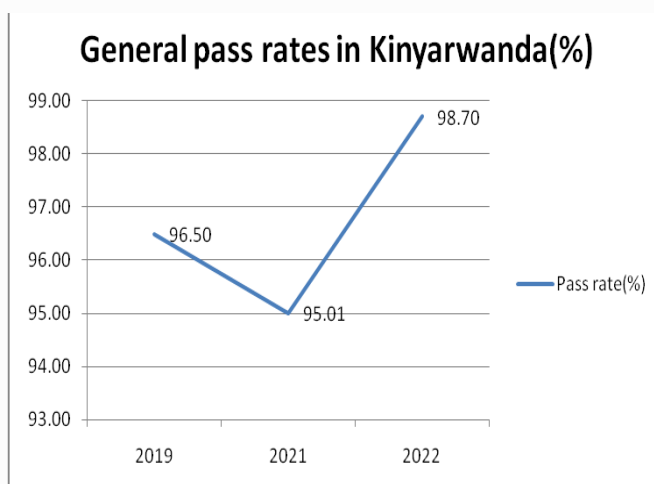


Figure 8: General pass rates in Kinyarwanda

Figure 8 shows the performance trend in Kinyarwanda in 2019, 2021, and 2022. The pass rate in 2019 and 2021 almost the same. However, in 2022, it increased significantly to 98.7. This suggests that efforts may have been made to improve teaching of Kinyarwanda, resulting in very high pass rates. Overall, the trend of improvement in Kinyarwanda pass rates is a positive sign that efforts are being made to support pupils in learning and mastering the language.

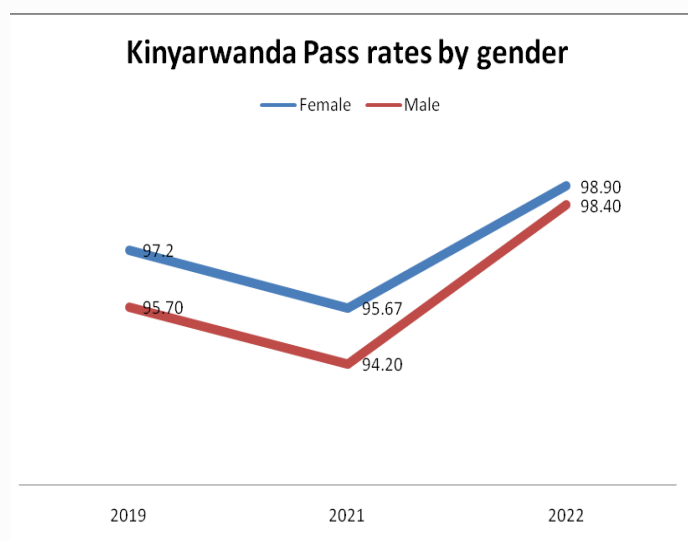


Figure 9: Pass rates in Kinyarwanda subject by gender

Figure 9 indicates the trend of pass rates in Kinyarwanda by gender. As can be seen in the figure above, there was no significant difference in pass rate between female and male pupils. There was a minimal gender disparity in sense that the pass rate of female pupils was slightly higher than that of male in 2019 and 2021, but in 2022 it was the same. This means that Kinyarwanda teachers made efforts to ensure that both male and female pupils had equal opportunities to succeed.

3.1.9 Mean and variability of scores in P.6 Kinyarwanda exam

Pupils' performance in Kinyarwanda national exams across the three years (2019, 2021 and 22) was analysed and the mean, standard deviation and variation coefficient were computed as indicated in the table below.

Table 3: Variation of scores in Kinyarwanda Subject

	2019	2021	2022
Mean	47.75	48.5	67.8
SD	17.92	16.63	14.8
VC	37.54	34.28	21.85
N	281,672	250387	227675

Table 7 presents the average score, standard deviation (SD), variation coefficient (VC), and the number of pupils (N) for Kinyarwanda subject across three academic years (2019, 2021, and 2022). On average, pupils' performance in Kinyarwanda was good in the three years analysed. The SD for Kinyarwanda subject decreased from 17.92 in 2019 to 16.63 in 2021 and to 14.8 in 2022. This suggests that the scores of pupils in Kinyarwanda subject are more clustered around the mean in 2022 than in 2019 and 2021 and the VC reflects show the same trend.

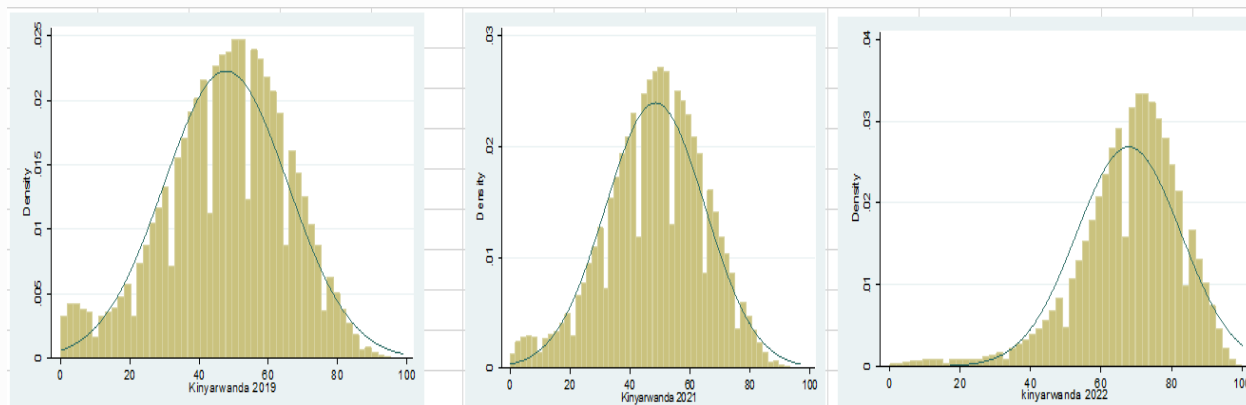


Figure 10: Distribution of Scores in Kinyarwanda Subject on the normal curve

The curves show that generally, the distribution of scores was between 30 and 75, with a few scores below 20 and above 80, especially in 2019 and 2021. Nevertheless, in 2022, the curve is mostly right-skewed with scores mostly between 50 and 85. Overall, distribution of scores in Kinyarwanda subject follows the normal distribution curve, particularly in 2022. However, there is still need for improvement, as some scores were below 20.

3.1.10 Pass rate in Kinyarwanda by location

The pass rate in Kinyarwanda was also analyzed by location, especially province, district, and rural and urban divide.

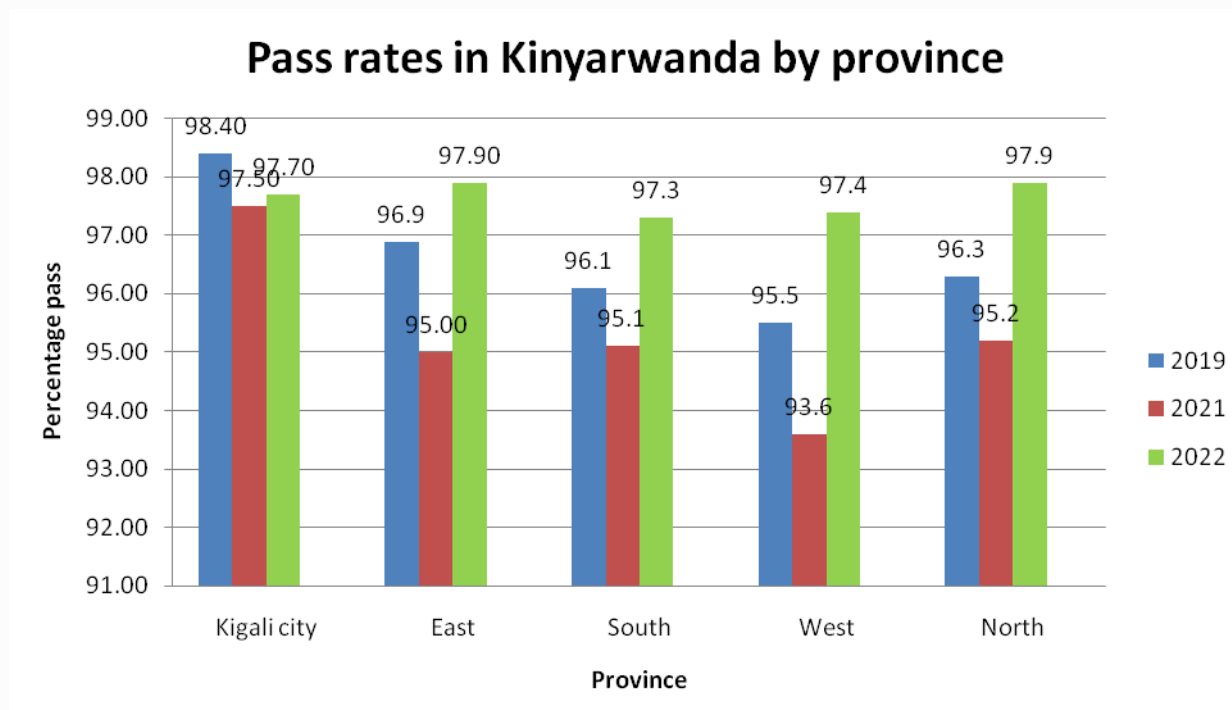


Figure 11: Pass rate in Kinyarwanda by Province

Figure 11 presents the percentage of pupils who passed Kinyarwanda national examinations across the provinces and city of Kigali in the years of 2019, 2021, and 2022. In 2019, the highest pass rate (98.4%) was observed in Kigali City followed by East (96.9%), North (96.3%), south (96.1%), and West (95.5%). Despite the observed differences in pass rates across the province and Kigali city, it can be inferred that performance was generally good. In 2021, the pass rates decreased slightly across all regions, with the highest pass rate observed in Kigali City (97.5%) and the lowest in the Western province (93.6%). However, in 2022, the pass rates increased significantly in all provinces and Kigali city, with the highest pass rate observed in the Eastern province (97.9%) and the lowest in the Southern province (97.3%).

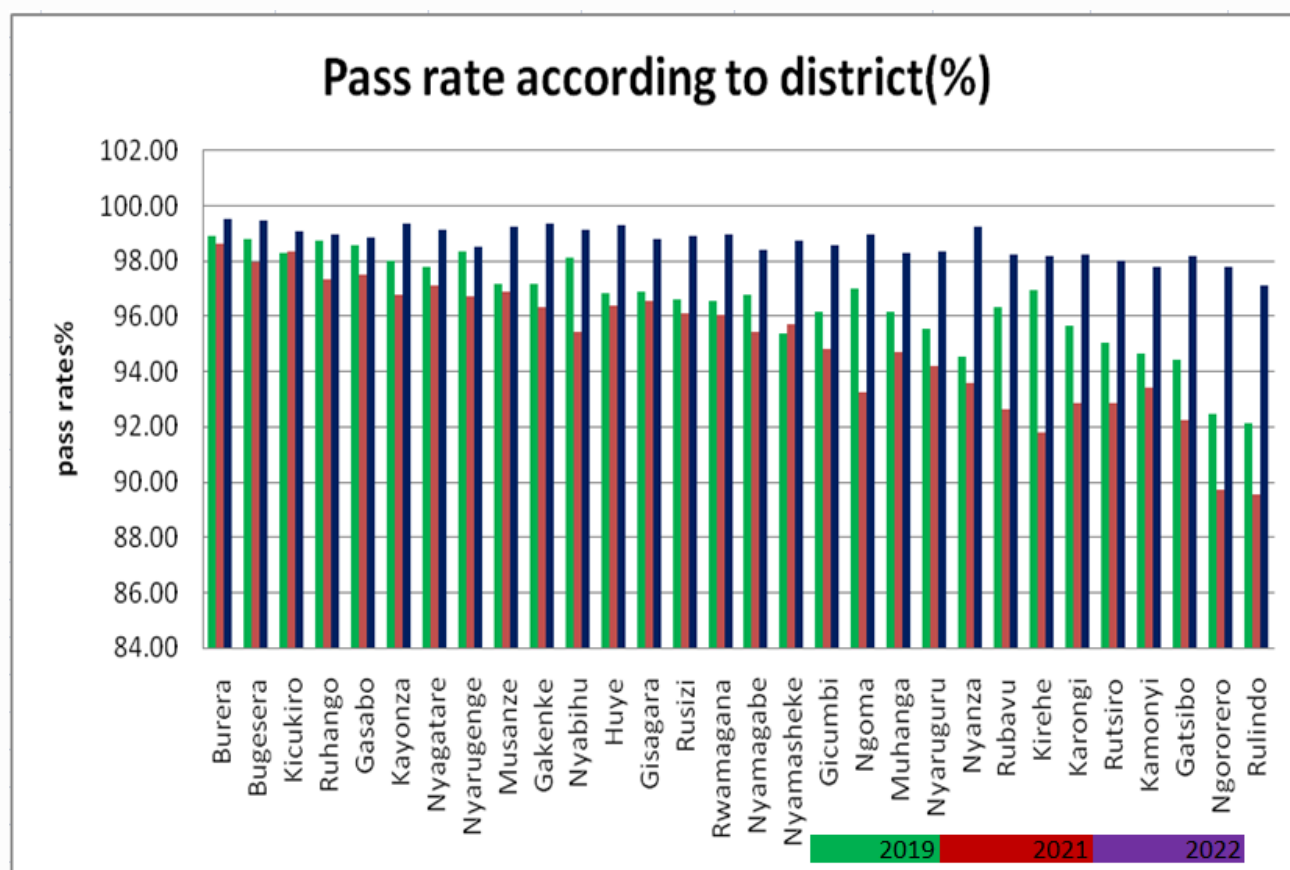


Figure 12: Pass rate in Kinyarwanda by District

Figure 12 presents the percentage of pupils who passed Kinyarwanda national examination in different districts in three academic years: 2019, 2021, and 2022. Accordingly, pass rates in Kinyarwanda in majority of the districts in the three years was over 90%. Only two districts; Rulindo and Ngororero had pass rates slightly below 90%. All in all, the pass rates portrayed good performance.

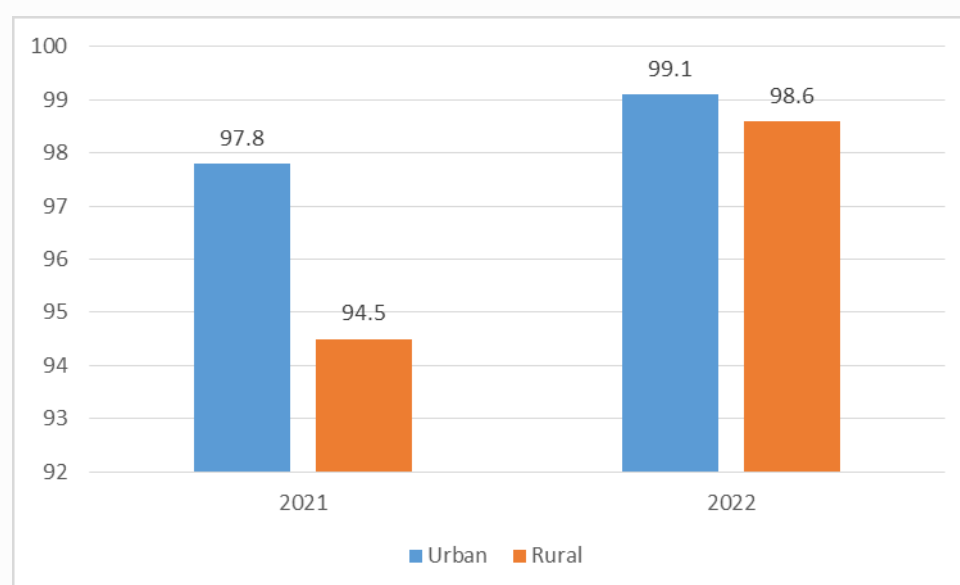


Figure 13: Pass rate in Kinyarwanda in Rural and Urban schools

Based on the data in Figure 13, the pass rate was generally high in both rural and urban schools in 2021 and 2022. In 2021, the pass rate for Kinyarwanda language in rural areas was 94.5%, while in urban areas it was 97.8%. Similarly, in 2022, the pass rate in rural schools was 98.6% and in urban it was 99.1%. While the pass rate was generally high, there were differences in pass rates between rural and urban school, with urban having relatively higher pass rate. The reasons for the high pass rate could be due to various factors, such as improved teaching methods, increased access to educational resources, or better curriculum alignment.

3.1.11 Pass rate in Kinyarwanda by school ownership

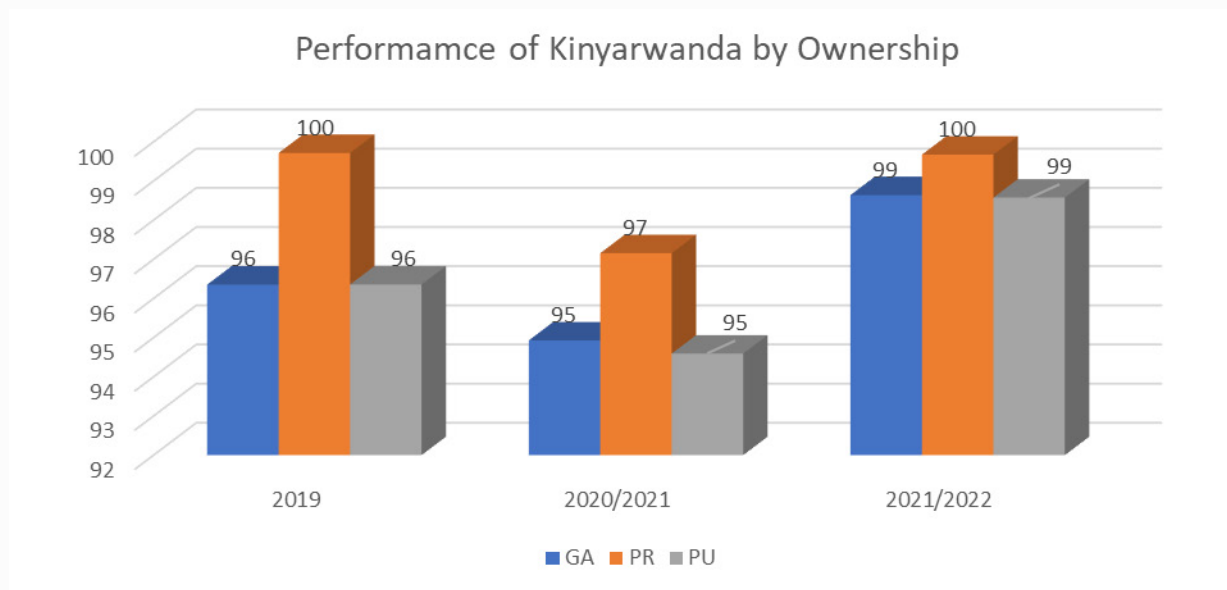


Figure 14: Pass rate in Kinyarwanda by school Ownership

Figure 14 shows the percentage of pupils who passed Kinyarwanda subject in three school years (2019, 2021, and 2022) by school ownership, that is, Government Aided (GA), Private (PR), and public schools (PU). Generally, the pass rate in private schools was relatively higher than in public and government aided in all the three years. With exception of 2022, the percentage of pupils who passed Kinyarwanda was nearly the same in 2019 and 2021 for GA and PU schools. However, in the Private schools, the pass rate was very high in 2022, with 100 % in PR and 99 in both GA and PU. Overall, the pass rates for Kinyarwanda by school ownership remained relatively high over the three years.

3.1.12 Primary School Pupils Pass rate in English subject

Like in other subjects, analysis of pupils' pass rate in English focused on the general pass rates, pass rates by gender, location, district, and school ownership.

3.1.13 General pass rate of Primary school pupils in English subject

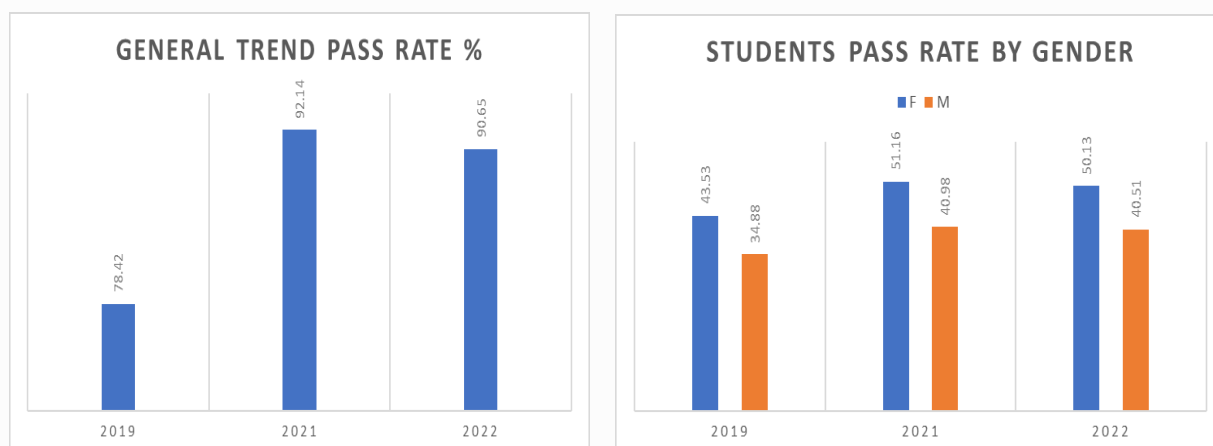


Figure 15: Primary school pupils Pass Rate in English subject

Figure 15 shows the general trend pass rate in English over the three academic years. The data indicates that there has been a steady increase in the pass rate of pupils in English over the years. In 2019, the pass rate was 78.42% and it increased to 92.14% in 2021, and then slightly reduced to 90.65% in 2022. Overall, there was a significant increment in pass rate in English in 2021 and 2022. Besides, Figure 15 mirrors that in 2019, the pass rate of female pupils was higher than that of male. The trend was the same in 2021 and 2022, which indicates that there was a consistent gender gap in the pass rate in English exams for primary six.

3.1.14 Mean score and distribution of scores in English subject

Table 14 presents Pupils' mean score, standard deviation and variation coefficient in English national exams for three years (2019, 2021 and 2022).

Table 4: Mean, SD & VC of scores in English Subject

	2019	2021	2022
Mean	22.67	30.51	37.62
SD	18.13	17.9	22.39
VC	79.98	58.96	59.51
N	281,615	250,387	227,656

As indicated in the table, the mean in 2019 was relatively lower than the mean for 2021 and 22. This implies that in the latter years, pupils' performance in English improved. With respect to SD, in 2019, it was 18.13, while in 2021 it slightly dropped to 17.9, indicating reduction in the variability of scores relative to the mean. The VC was 79.98 in 2019, indicating high variability in scores relative to the mean and it

decreased to 58.96 in 2021 and 59.51 in 2022, indicating low variability, hence the scores were clustered around the mean with small differences.

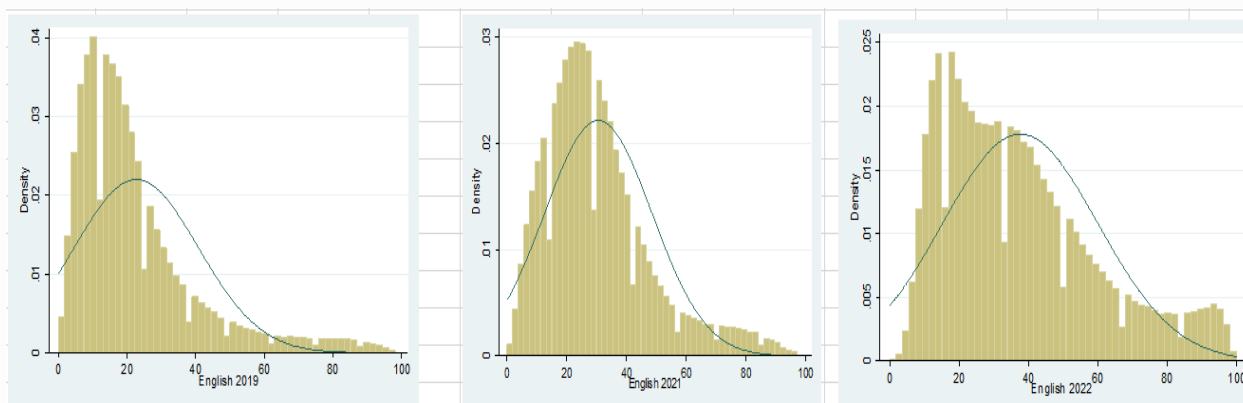


Figure 16: Distribution of Scores in English Subject

Based on the nature of curves in Figure 16, the scores in English subject for the years 2019 and 2021 are not normally distributed meaning there were variations in scores with most scores less than the mean. However, in 2022, the distribution of the scores were becoming symmetrical, which means that the scores were somewhat spread around the mean, hence better performance than in 2019 and 2022.

3.1.15 Pass rate in English by location

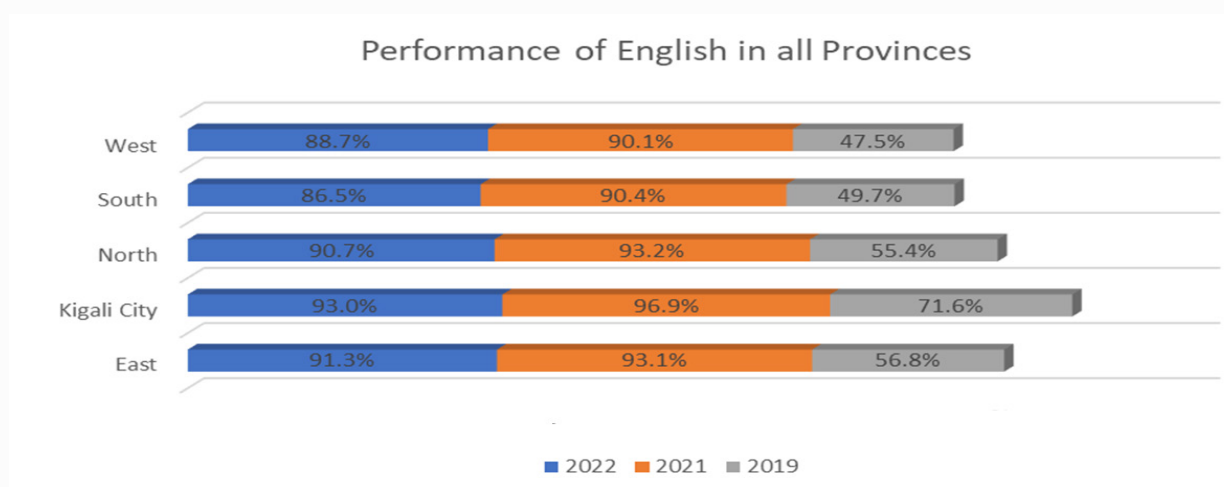


Figure 17: Pass rate in English in all Provinces

The figure above shows pupils' pass rate in English in the four Provinces and the City of Kigali for the years 2019, 2021, and 2022. Kigali City had the highest pass rate while the Southern and Western provinces had the lowest pass rates in the three years. In 2019, the pass rate was very low compared to 2021 and 2022. In 2022, the pass rate was slightly lower in all the provinces compared with 2021.

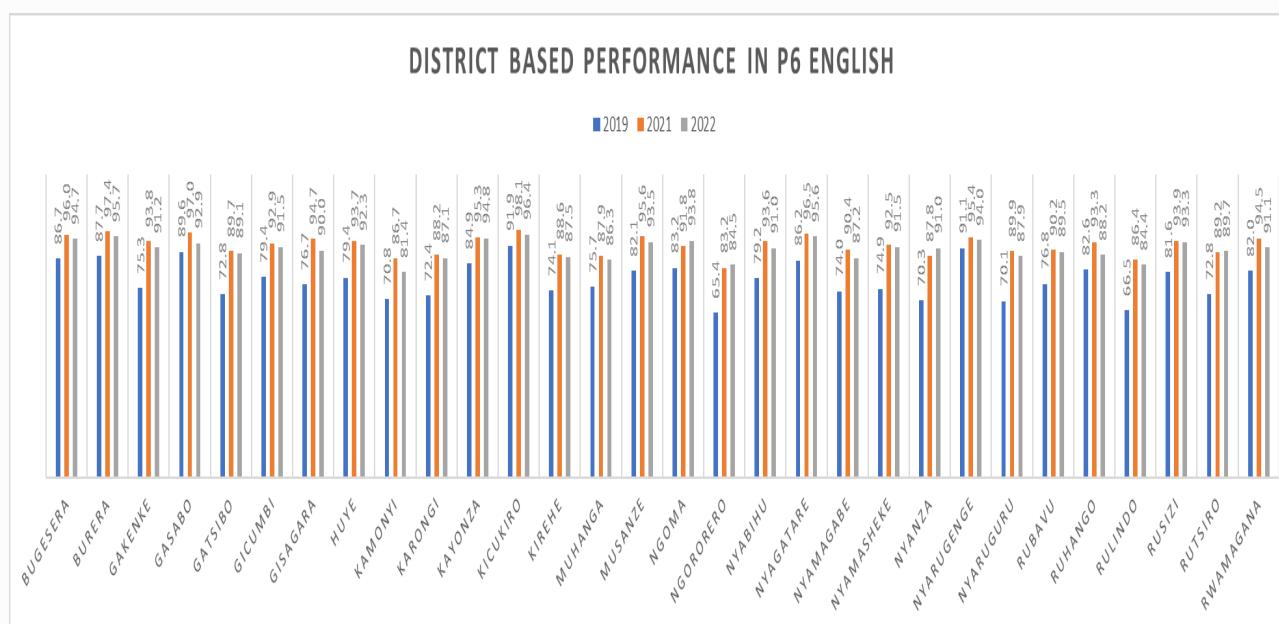


Figure 18: Pass rate in English by District

Figure 18 shows that in 2019, the highest pass rate was in Kicukiro district with 91.9%, followed by Nyarugenge district with 91%, and Gasabo district with 90%. The lowest pass rates were in Ngororero district with 65%, Rulindo district with 66%, and Nyaruguru district with 70%. In 2021, there was a significant improvement in pass rate in almost all the districts, with Kicukiro district still having the highest pass rate of 98%, followed by Nyarugenge district with 95%, and Gasabo district with 97%. The lowest pass rates were in Kamonyi district with 81%, Ruhango district with 88%, and Nyaruguru district with 90%. In 2022, the pass rates remained high in almost all districts, with Kicukiro district still having the highest pass rate of 96%, followed by Nyarugenge district with 94%, and Gasabo district with 93%. The lowest pass rates were in Ruhango district with 88%, Ngororero district with 84%, and Rulindo district with 84%.

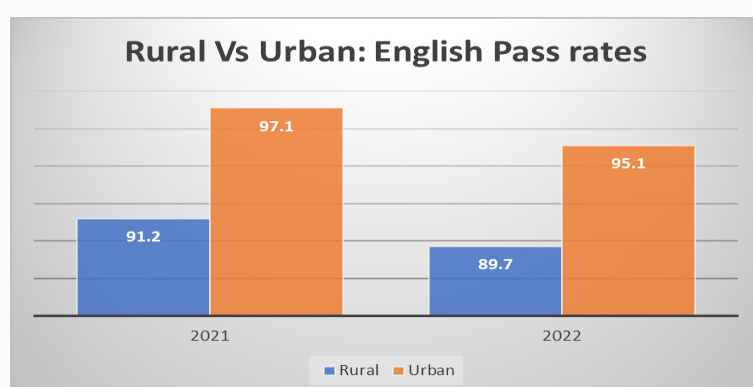


Figure 19: Pass rate in English in Rural and Urban schools

From Figure 19, it is evident that the pass rates rural schools in 2021 and 2022 were relatively lower than in urban school. It is important to note that there could be several factors contributing to the differences in pass rates between rural and urban schools which call further investigations to determine the underlying reasons.

3.1.16 Pass rate in English by school ownership

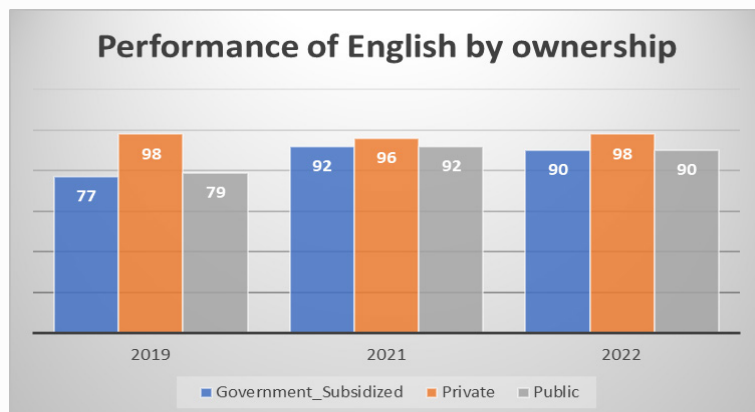


Figure 20: Pass rate in English by School Ownership

Figure 20 shows pupils' pass rate in English in the three school years (2019, 2021, and 2022) by school ownership. However, in 2021 and 2022, there was an increase in the pass rate in public and government aided schools. In private, it slightly reduced by % in 2021 and remained the same (98%) as in 2019. The findings suggest that interventions are needed to reduce the gap between private and other types of schools.

3.1.17 Pass rate in Primary SET subject

The pass rate of pupils' in in Primary SET national exams was analyzed and the figure below shows the overall pass rate and by gender for the three years considered.

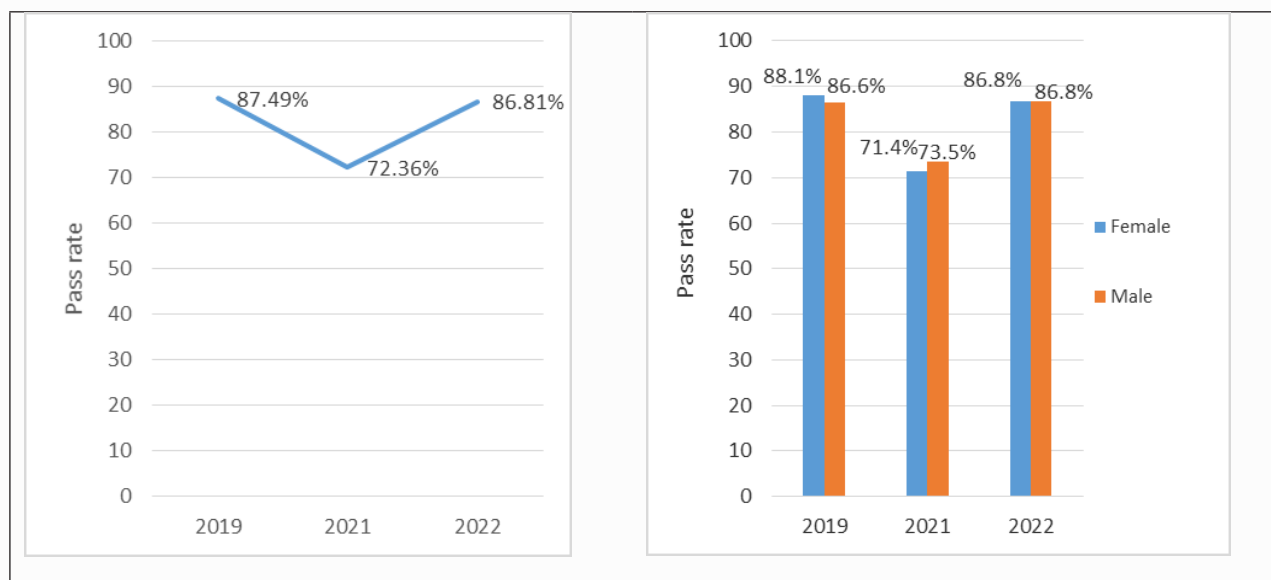


Figure 21: General pass rate trend in SET and pass rate by gender

Figure 21 shows the pass rate trends in Science and Elementary Technology (SET) in 2019, 2021 and 2022. In 2019, the pass rate in SET was 87.49%, indicating a high level of proficiency in science and elementary technology subjects among pupils. However, in 2021, the pass rate significantly reduced to 72.36%, indicating

a substantial drop in SET proficiency. This decline in pass rate could be to the disruptions of learning caused by the COVID-19 pandemic. The pandemic led to closure of schools and a shift to online learning, which may not have been accessed by all pupils.

In 2022, the pass rate in SET rose to 86.81%, indicating improvement in SET proficiency, but still below the 2019 pass rate. This means that more effort is needed to fully recover from the disruptions caused by the pandemic.

In terms of gender, there was generally no significant difference in pass rate between boys and girls across the three school years considered in the analysis. For instance, in 2019, the pass rate for girls (88.1%) was slightly more than that of boys, which stood at 86.8%. Similarly, in 2021, the pass rates for girls and boys were 71.4% and 73.5% respectively. In 2022, the pass rate for boys and girls was the same (86.8%).

Overall, the data suggest that the COVID-19 pandemic had a significant impact on children's pass rate in SET in Rwanda, with a notable decline in 2021. The improvement seen in 2022 suggests that teachers have made relentless efforts to mitigate the negative concomitants of the pandemic impact of the pandemic, but there is still need for improvement.

3.1.18 Mean and variability of scores in P.6 SET exam

Determining the mean and standard deviation for student exam results is important because it provides valuable information about the distribution of scores and the general performance of the student. The table below provides the mean, standard deviation and Variation Coefficient in SET national exams for three years.

Table 5: Mean, SD and variability of scores in SET Subject

	2019	2021	2022
Mean	23.45	21.86	33.75
Standard Deviation (SD)	15.24	19	21.85
Variation Coefficient (VC)	65	86.88	64.73
Number of pupils	281,586	250,387	227,667

The mean score for SET in 2019 was 23.45, indicating that on average, student performed relatively well, but in 2021, the mean score declined to 21.86, indicating a drop in the average performance of pupils in SET. However, in 2022, the mean score improved significantly to 33.75, indicating a significant recovery in the average performance of pupils in SET.

With respect to Standard Deviation (SD), in 2019, the SD was 15.24, indicating that the scores were relatively clustered around the mean. In 2021, the SD increased to 19, indicating greater variability in scores while in 2022, the SD increased further to 21.85, suggesting that the distribution of scores was more spread out.

The variation coefficient (VC) is a measure of relative variability, calculated as the SD divided by the mean multiplied by 100. In 2019, the VC for SET was 65, indicating a moderate level of variability. In 2021, the VC increased significantly to 86.88, indicating a high level of variability. In 2022, the VC decreased to 64.73, indicating a decrease in the relative variability of scores. The number of pupils (N) taking SET in Rwanda was 281,586 in 2019, 250,387 in 2020/2021, and 227,667 in 2022. This decrease in the number of pupils taking SET may be due to the disruptions caused by the COVID-19 pandemic. Overall, the data suggests that there was a decline in the average p of pupils in SET in 2021, likely due to the disruption caused by the pandemic. However, there was a significant improvement in 2022, although there was also an increase in variability in scores.

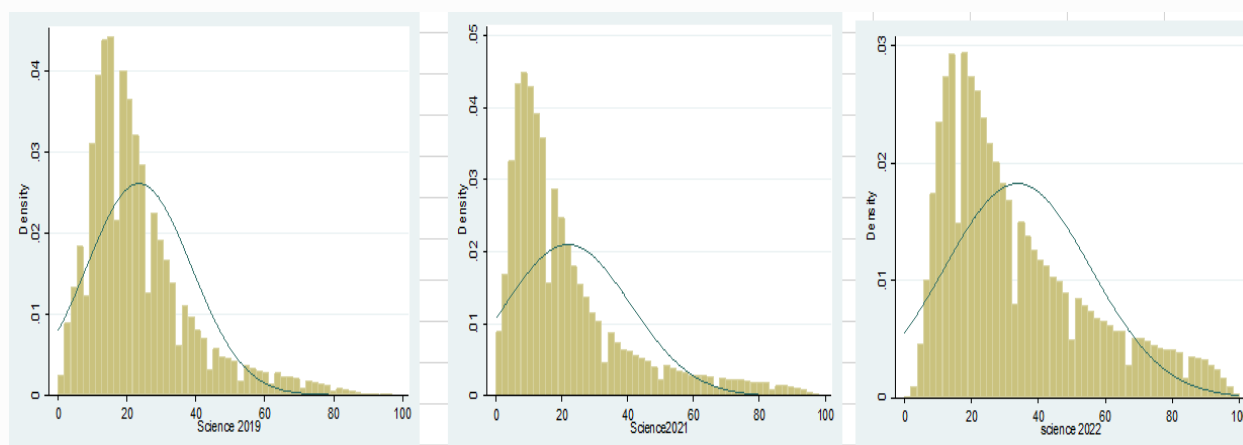


Figure 22: Distribution of Scores in SET Subject

As indicated in Figure 22, in 2019, the majority of pupils scored between 0 and 30, with very few scores above 50 while in 2021, the distribution shifted slightly to the right, with more pupils scoring between 5 and 40.

In 2021/2022, there was a noticeable shift in the distribution, with more pupils scoring in the range of 10 to 50. The distribution also appeared to have a flatter curve, indicating that there was less variability in scores among pupils. Despite this shift, there were still very few scores above 50, suggesting that the SET subject is a challenging subject for many pupils.

Overall, the distribution of scores in the SET subject appears to be improving over time, with fewer pupils scoring in the lower range and more pupils scoring in the mid-range. The Chief markers of SET examination paper report shows that the performance of pupils in 2022 National examinations was due to the Language barrier, Lack of teaching materials and family poverty.

3.1.19 Pass rate in National SET exams by location

The pass rate of pupils in national SET exams was analysed by province to identify disparities, if any, and the causes of the differences and the figure below provides detail.

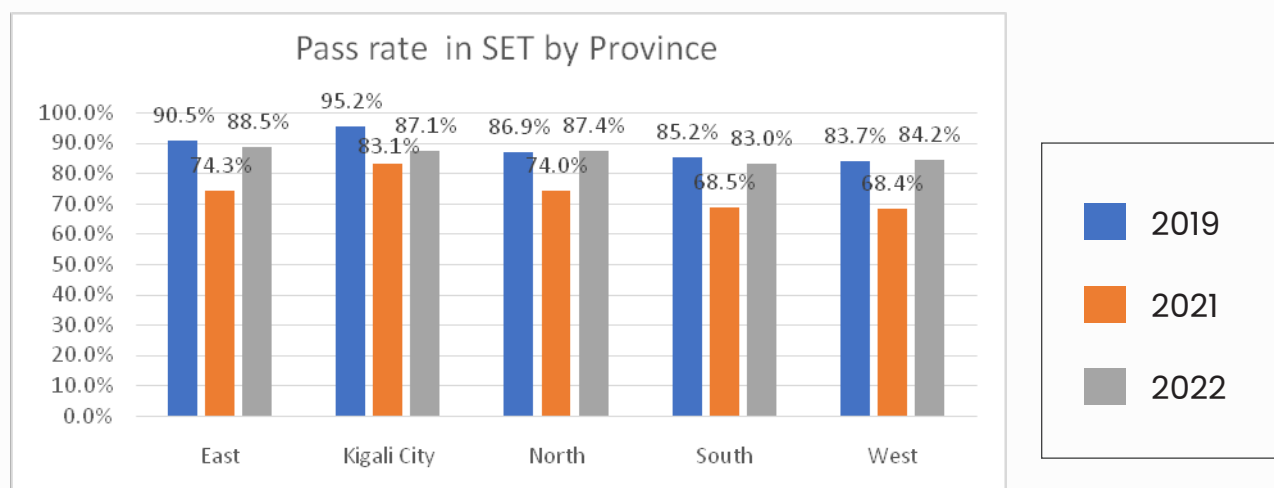


Figure 23: Pass rate in National SET by location

Figure 23 shows pupils pass rate in the SET subject by province over three years (2019, 2021, and 2022). In 2019, Kigali City had the highest pass rate in the SET subject (95.2%), followed by the East province with a pass rate of 90.5%. The North, South, and West provinces had pass rates between 83.7% and 86.9%.

In 2021, there was a drop-in pass rate across all provinces, with Kigali City still having the highest pass rate of 83.1%, followed by the East province with a pass rate of 74.3%. The other three provinces had pass rates between 68.4% and 74.0%.

In 2022, there was a sizeable increase in pass rate compared to the previous year. However, in Kigali City there was a reduction in pass rate (87.1%), while the East province had the highest pass rate which stood at 88.5%. The North and West provinces had pass rates of 87.4% and 84.2%, respectively, while the South province had the lowest pass rate at 83.0%.

Overall, there were variations in pass rate across the provinces over the years. It is worth noting that while Kigali City consistently had the highest pass rate, the in other provinces the pass rate varied across the three school years considered (2019, 2021 & 2022). Further analysis could be undertaken to understand the factors that contribute to these variations and to identify potential interventions to improve the performance of pupils in SET subject across all the provinces.

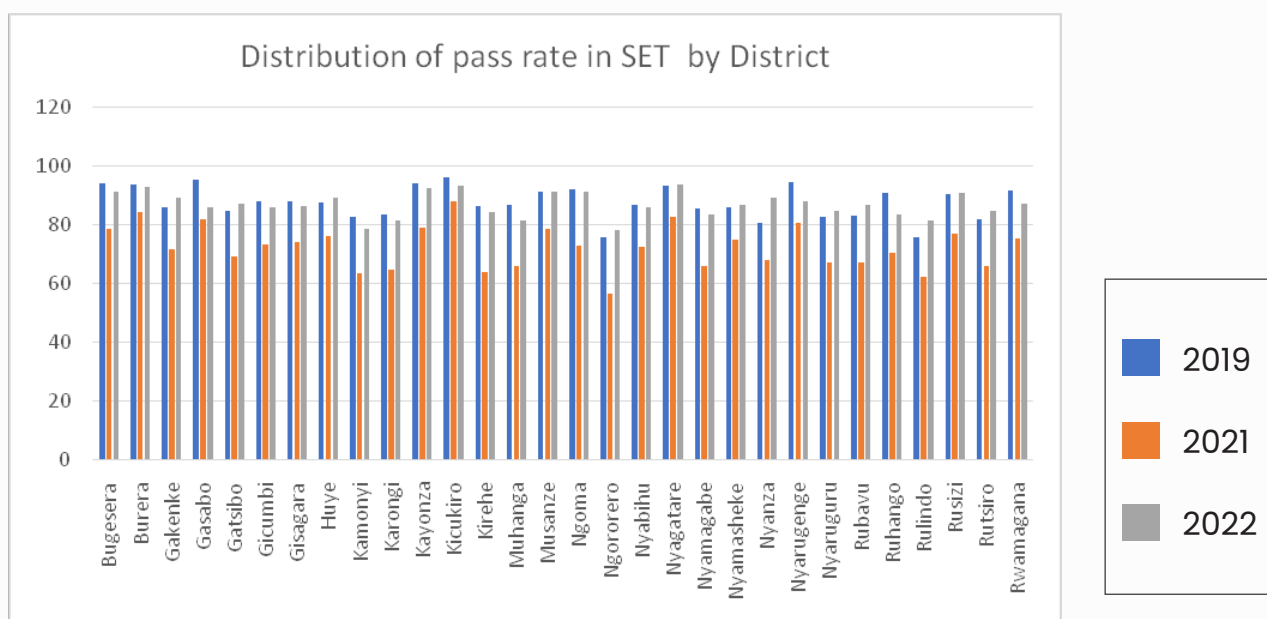


Figure 24: Pass rate in SET disaggregated by district

Figure 24 shows student pass rate in the SET subject by district in the school years of 2019, 2021, and 2022. In general, there is a significant variation in the pass rate by districts. Some districts, such as Burera, Kicukiro, and Nyagatare, had a relatively higher pass rate | (above 80%) across the three school years. On the other hand, districts such as Ngororero and Rulindo, performed poorly, especially in 2021 with the pass rates below 60% and slightly above 60% respectively.

However, it is worth noting that some districts performed better in 2022 compared to 2021 and these districts include Gicumbi, Gisagara, and Nyarugenge. Overall, the pass rate in SET varied widely across the districts in the sense that some districts consistently performed well across the three years while others had significant differences.

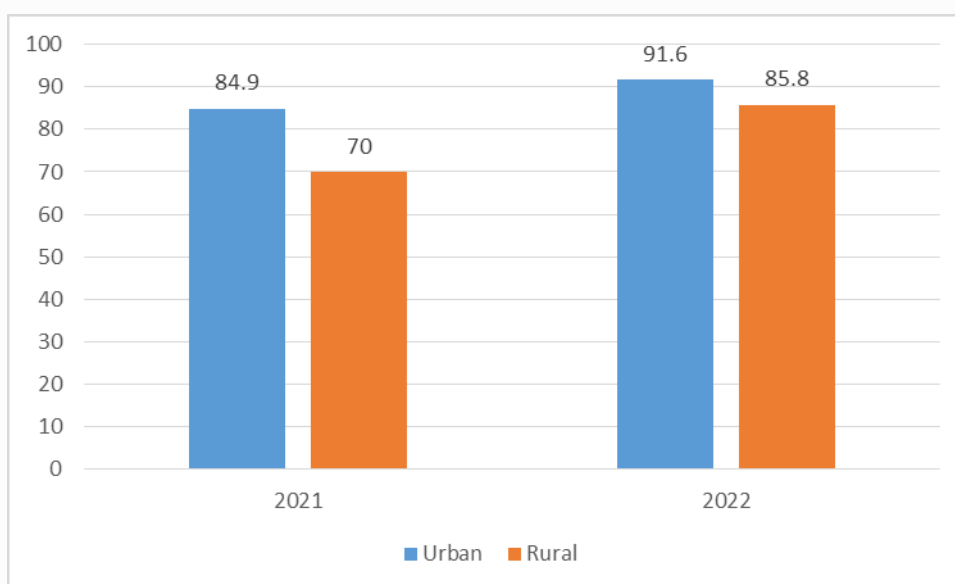


Figure 25: Pass rate in SET by rural and urban schools

As can be seen in Figure 25, in 2021 and 2022, student pass rate in rural schools was relatively low compared to urban school. In 2021, the pass rate for SET in rural schools was 70.0%, while in urban it stood at 84.9%. However, in 2022, the pass rate for SET in rural schools increased significantly to 85.8%, but lower than in urban school which was 91.6%. The increase in pass rates could be due to various factors including improved teaching methods and increased access to educational resources. It's important to further investigate the underlying reasons for the increase in pass rates to identify best practices and strategies that could be applied by other schools.

3.1.20 Pass rate in SET by school ownership

The analysis of the SET national examinations was also done according to ownership, that is, Government Aided (GA), Private (PR) and Public (PU). Figure 18 presents detail of the analysis.

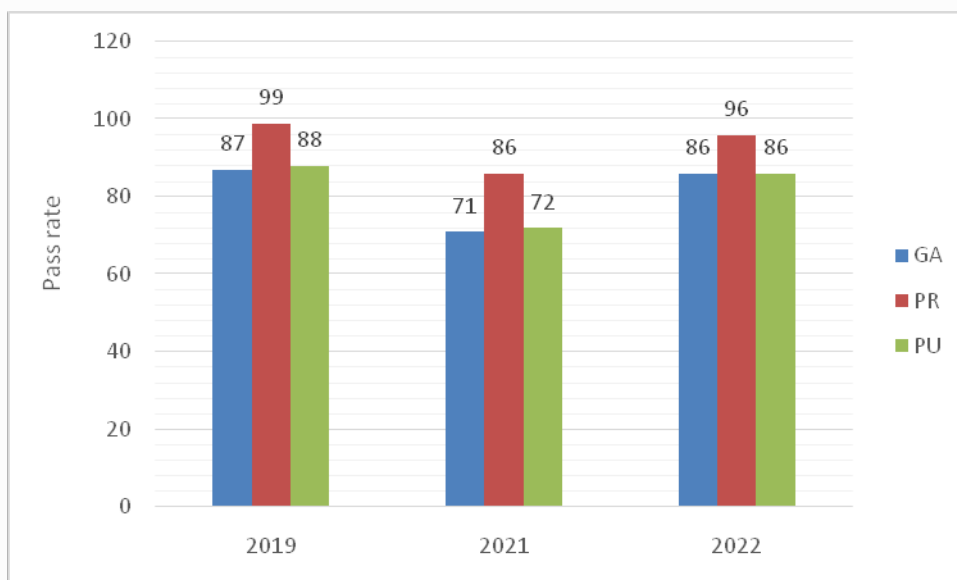


Figure 26: Pass rate in SET by school ownership

According to Figure 26, in 2019, private schools had the highest pass rate in SET (99%). There was no big difference in the pass rate between Government-aided schools (87%) and public schools (88%). In 2021, the pass rate dropped to 71% and 72% in Government-aided schools and public schools respectively. However, in 2022, the overall pass rate increased to 86%, in both government-aided and public schools. Similarly, it rose to 96% in private schools. The data suggests that private schools consistently performed better in SET than government-aided and public schools across the three school years. However, there were an improvement in pass rate in in all the three categories of schools in 2022 compared to 2021. Overall, in the three school years, the pass rate for SET in private schools was consistently higher than other categories of schools.

3.1.21 Pass rate in Social and Religious studies

Analysis of pupils' results in Social and religious studies national exams, focused on the general pass rates, pass rates by gender, location, district and by ownership.

3.1.22 Pass rate in Social and religious Studies National exams in General and by Gender

The figure below shows pupils' pass rate in Social and religious studies national exams in general and by gender for three years, that is, 2019, 2021 and 2022.

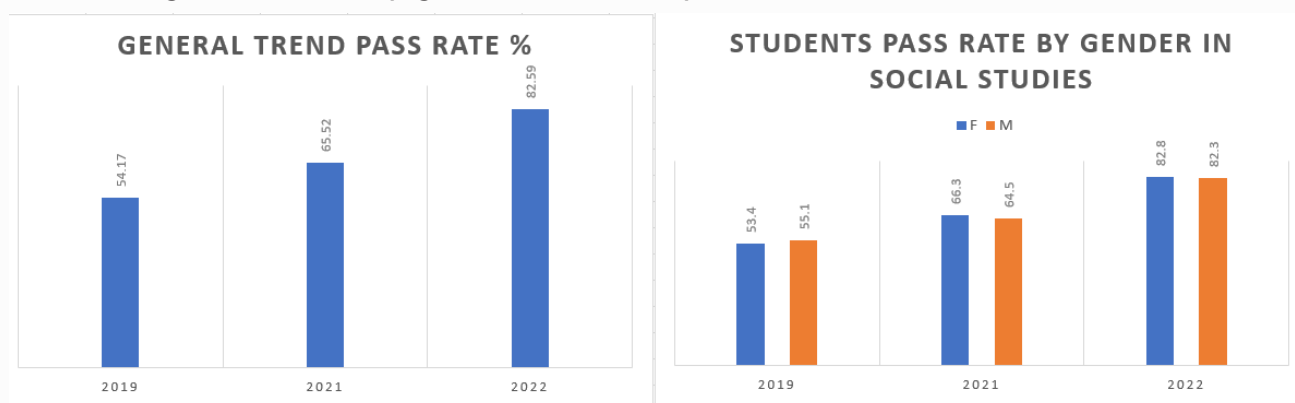


Figure 27: General pass rate in Social and Religious Studies national exams and by gender

According to Figure 26, there was a progressive increase in the general pass rate in Social and religious studies over the three years. In 2019, it was 54.17% while in 2021 it rose to 65.52%. Similarly, in 2022 the general pass rate increased to 82.59%. However, when disaggregated by gender, there was no significant difference in pass rate between female and male pupils across the three years. Overall, there was a positive trend in the pass rate in Social Studies and both female and male pupils passed at almost the same rate.

3.1.23 Mean score, SD & VC of scores in Social and Religious Studies

The table below provides the mean, standard deviation and Variation Coefficient in Social Studies national exams for the three years.

Table 6: Mean score, SD and VC in Social and Religious Studies Subject

	2019	2021	2022
Mean	18.35	25.77	38.79
SD	20.1	24.78	25.97
VC	109.51	96.17	66.94
N	281,024	250387	227484

From Table 6, it is clear that despite a steady increase in 2021 and 2022, pupils' performance in Social and religious studies was generally poor as evidenced by the mean scores. Moreover, the standard deviations and variation coefficients show that the scores were more spread out from the mean especially in 2019 and 2021 than in 2022. Overall, the data suggests that pupils' performance in Social Studies improved in 2021 and 2022, but was still low.

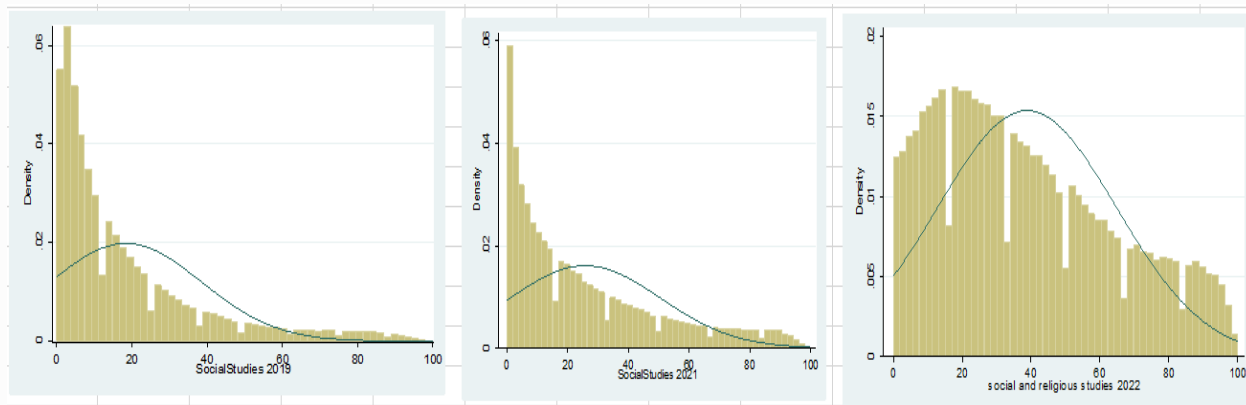


Figure 28: Distribution of Scores in Social and Religious Studies

As can be seen in Figure 28, in 2019 and 2021, the curves are non-symmetrical and the scores on the normal distribution curves are widely distributed, which means that the scores were more spread from the mean and less consistent. Nevertheless, in 2022, the scores were less variable and more consistent as evidenced by the narrowness of the curve.

While there was a shift in the distribution of scores in 2022 indicating improvement in pupils' performance, it was still low. Further analysis is therefore needed to understand the factors that contributed to low performance though the Chief exam markers of social and religious studies reported some factors such as language barrier, not having covered the content in the time and less revision exercises, candidate' family poverty and lack of teaching & learning materials. These are normally barriers to good performance.

3.1.24 Pass rate in Social and religious studies by location

Analysis of pass rate by location encompassed province, district and rural urban divide. Figures 29–31 provide details of the distribution.

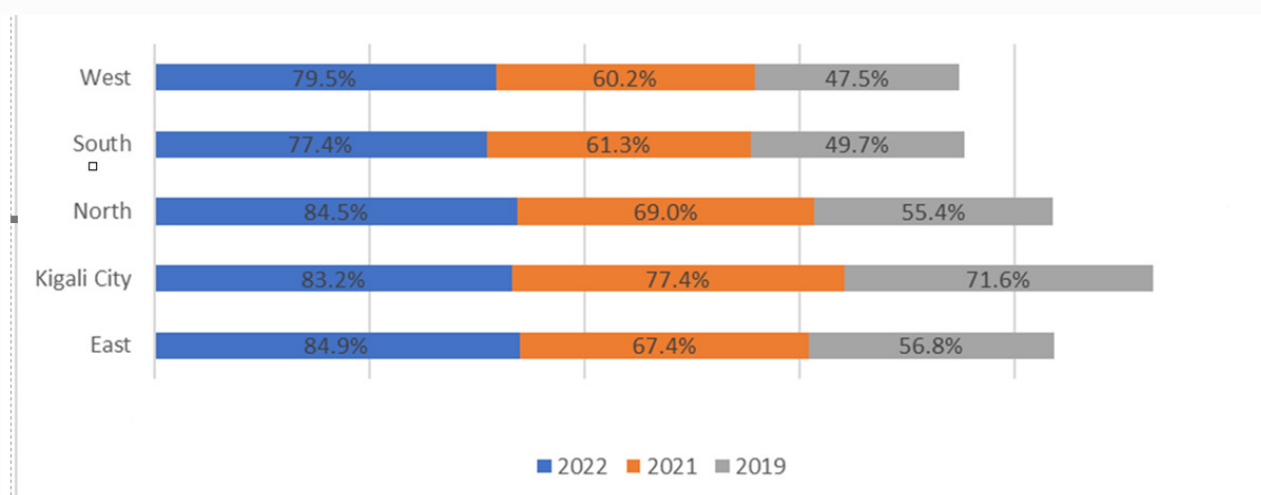


Figure 29: Pupils' pass rate in social studies by province

As indicated in Figure 29, in 2019, the province with the highest percentage of pupils who passed Social Studies subject was Kigali City with 71.6%, followed by Eastern province with 56.8%. The provinces with the lowest pass rate were Western and Southern with 47.5% and 49.7%, respectively. In 2021, the trend was similar to 2019, with Kigali City and Northern province having the highest percentage of pupils who passed. In 2022, the percentage of pupils who passed the subject continued increased in all the provinces and Kigali city. However, Eastern province had the highest percentage of pupils who passed the subject with 84.9%, followed by North province with 84.5%. South and West provinces had the lowest percentage of pupils who passed with 77.4% and 79.5%, respectively. Overall, the data suggests that there has been an improvement in the pass rate in Social Studies subject across all provinces over the three years. Kigali City and Eastern province consistently had the highest percentage of pupils who passed while Southern and Western provinces consistently had the lowest percentage of pupils who passed.

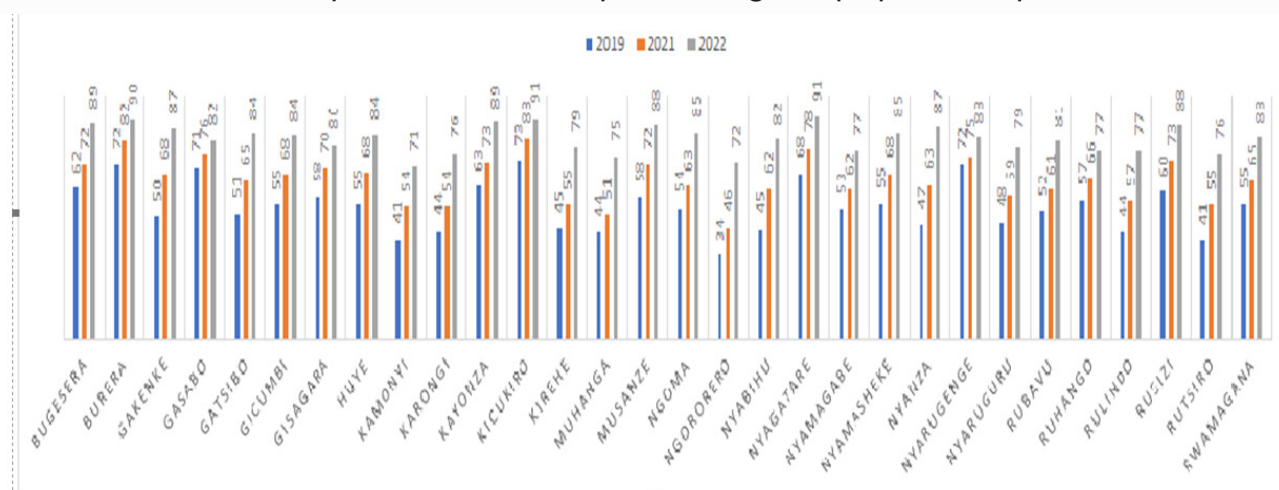


Figure 30: Pass rate in Social Studies by District

From Figure 30, in 2019, the district with the highest percentage of pupils who passed Social Studies subject was Burera with 72%, followed by Kicukiro with 73%. The districts with the lowest percentage of pupils who passed the subject were

Ngororero and Rutsiro with 34% and 41%, respectively. In 2021, the percentage of pupils who passed increased in all districts. Kicukiro had the highest percentage (83%), followed by Burera with 82%. The district with the lowest percentage of pupils who passed was Rutsiro with 55%. In 2022, the percentage of pupils who passed the subject increased in all districts with Kicukiro having the highest pass rate (91%), followed by Nyarugenge and Nyagatare with 83% and 91%, respectively. The district with the lowest percentage of pupils who passed was Rulindo with 77%.

Overall, the data suggests that there was an improvement in the performance of pupils in Social Studies subject across all districts over the three years. Kicukiro consistently had the highest percentage of pupils who passed the subject, while Rutsiro consistently had the lowest percentage of pupils who passed the subject. The increase in the percentage of pupils who passed the subject in all districts indicates a positive trend in pupils' learning and understanding of the subject.

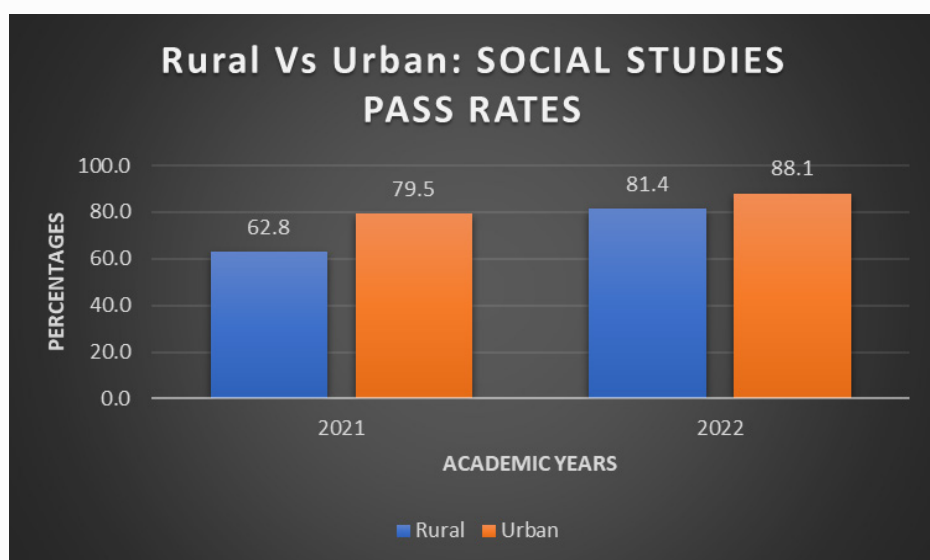


Figure 31: Pass rate in Social Studies in rural and urban schools

Figure 31 shows that there is an increase in the pass rates for Social Studies in both rural and urban areas from 2021 to 2022. In 2021, the pass rate for Social Studies in rural areas was 62.8%, while in urban areas it was 79.5%. However, in 2022, the pass rate for Social Studies in rural areas increased significantly to 81.4%, while in urban areas it increased to 88.1%. The difference in pass rates between rural and urban areas is still evident in both years, whereby in rural schools, the pass rate was low compared to urban schools. The disparities call for investigation to find out the underlying reasons and to identify successful strategies that could be applied to rural areas to improve pupils' performance.

3.1.25 Pass rate in Social Studies by school ownership

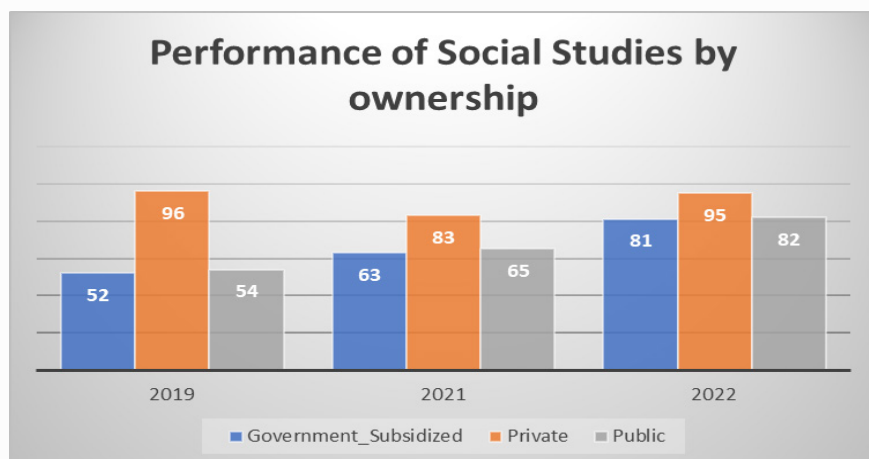


Figure 32: Pass rate in Social Studies by school ownership

Figure 32 shows the performance of pupils in Social Studies subject by ownership (government-aided, private, and public) for three years: 2019, 2021, and 2022.

In 2019, the private schools had the highest percentage of pupils passing Social Studies subject (96%), followed by public schools (54%) and government-aided schools (52%). In 2021, the private schools still had the highest percentage of pupils passing Social Studies subject (83%), followed by public schools (65%) and government-aided schools (63%). In 2022, the private schools continued to have the highest percentage of pupils passing Social Studies subject (95%), followed by public schools (82%) and government-aided schools (81%).

Overall, the percentage of pupils passing Social Studies subject increased over the three years for all ownership types. The total percentage of pupils passing Social Studies subject increased from 54% in 2019 to 66% in 2021 and further to 83% in 2022. Private schools consistently had the highest percentage of pupils passing the subject across all three years, while government-aided schools had the lowest percentage of pupils passing the subject.

3.1.26 Mean and VC of all Subjects at primary school level

Pupils' mean and variation coefficient for all the subjects examined were computed and details are presented in Table 7.

Table 7: Average scores and variation Coefficient in all Subjects

	2019		2020/2021		2021/2022	
Subject	Mean	VC	Mean	VC	Mean	VC
Maths	14.53	105.62	20.7	102.98	21.64	90.6
Science	23.45	65	21.86	86.88	33.75	64.73
Social studies	18.35	109.51	25.77	96.17	38.79	66.94
English	22.67	79.98	30.51	58.96	37.62	59.51
Kinyarwanda	47.75	37.54	48.5	34.28	67.8	21.85

The table 7 shows the average scores, variation coefficients, and subjects' performance for all primary subjects from 2019 to 2022. The mean scores for all subjects have increased over the years. The highest increase is observed in Social Studies, where the mean score increased from 18.35 in 2019 to 38.79 in 2022. In terms of variation coefficients, Social Studies had the highest variation coefficient in 2019, indicating that the scores were more widely spread out compared to the other subjects. However, the variation coefficient for Social Studies reduced over the years, which means that the scores were less dispersed. On the other hand, the variation coefficient for science remained relatively stable over the years. In terms of individual subject performance, Kinyarwanda had the highest mean score in all years, while Mathematics had the lowest mean score in 2019 and 2021. However, Mathematics showed the highest improvement in mean scores between 2019 and 2022, with an increase of 7.11 points. Science also showed a significant increase in mean scores from 2019 to 2022, with an increase of 10.3 points.

Overall, the data suggests that there has been significant improvement in primary school pupils' performance in all subjects, with notable increases in Social Studies, Mathematics, and Science. The reduction in variation coefficients for Social Studies suggests that efforts to improve teaching and learning in this subject have been successful in reducing disparities in student performance.

3.2. Analysis of Ordinary Level (S3) National examination results for 2019, 2021 and 2022

As earlier mentioned, at O-level, national exam results of 9 subjects were analysed. The analysis focused on general pass rate in all subjects, pass rate and performance in subject disaggregated by gender, school ownership, rural-urban divide, district, and province.

Table 8: General pass in all examinable subjects at Ordinary Level

S3						
Candidates/schools	2019	%	2021	%	2022	%
Registered candidates	115,414	100%	122,536	100%	127,589	100%
Candidates who sat for all exams	114,426	99.1%	121,626	99.3%	127,078	99.6%
Candidates who passed	99,122	86.6%	105,008	86.3%	108,566	85.4%

Table 8 shows data for the Ordinary Level (S3) National examination candidates for the years 2019, 2021, and 2022. As indicated in the table above, the total number of registered candidates increased from 115,414 in 2019 to 122,536 in 2021 and to 127,589 in 2022. The number of candidates who sat for all exams was consistent across the three years with an insignificant difference. The percentage of candidates who passed the exams remained relatively consistent over the three years. In 2019 the percentage stood at 86.6% while in 2021 it slightly dropped to 86.3%. Similarly, in 2022 the percentage slightly dropped to 85.4%. Overall, the findings suggest that there was a considerable increase in the number of registered candidates and the number of candidates who sat for all exams over the three years. However, the pass rates remained relatively consistent, with only slight variations.

3.2.1 General pass rate in S.3 Mathematics national exams

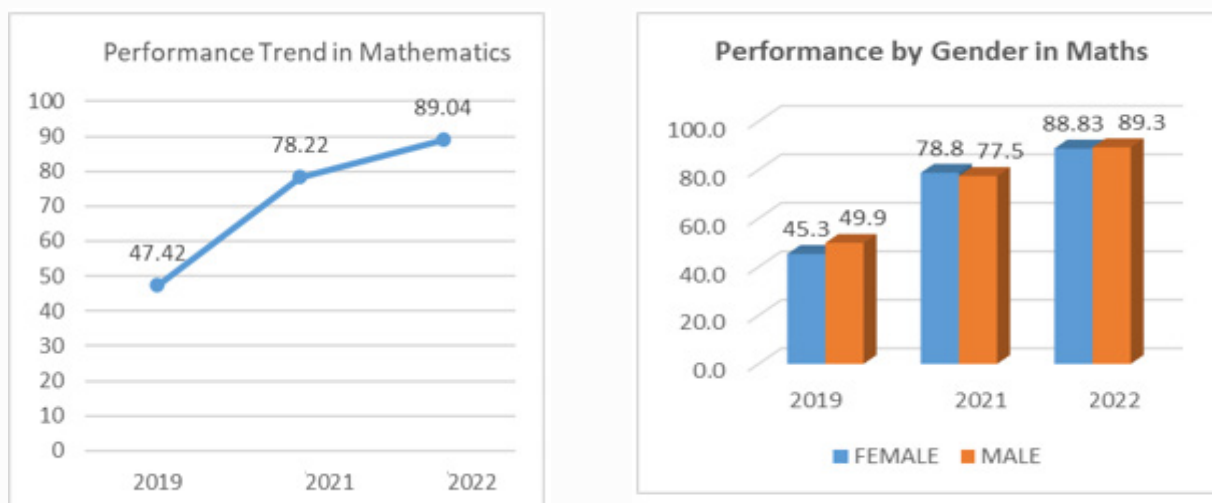


Figure 33: General Pass rate trend in Mathematics for S3 and pass rate by gender

As indicated in the figure above, there was a considerable increase in the general pass rate from 47.42%, in 2019 to 78.22 % in 2021 and to 89.04% in 2022. This is a remarkable improvement from the previous years and it indicates that the students in S3 continued to excel in Mathematics. In relation to gender, in 2019, female pass was 4.5% lower than male while in 2021 and 2022, the pass rate of female and male was nearly the same. Overall, the pass rate in Mathematics among male students was slightly more than that of female.

3.2.2 Mean, standard deviations and variation coefficient in S.3 mathematics

The table below indicates the mean, standard deviations and variation coefficient over the three years considered for analysis.

Table 9: Mean, standard deviations and variation coefficient in S.3 mathematics

	2019	2021	2022
Mean	19.03	37.9	26.5
SD	17.7	25.4	20.8
VC	93.4	66.9	78.6
N	114,423	121,201	127,161

Table 9 presents the average score, standard deviation (SD), variation coefficient (VC), and number of students (N) in Mathematics subject in the three years: 2019, 2021, and 2022. The mean score for Mathematics in 2019 was 19.03 and greatly increased to 37.9 in 2021, and then slightly decreased to 26.5 in 2022. This indicates that students performed better in Mathematics in 2021 compared to 2019, but slightly declined in 2022 compared to 2021. The SD and VC show that there was

high variability in performance relative to the mean scores in 2019 was 17.7 and increased to 25.4 in 2021 and then decreased to 20.8 in 2022. Overall, the data suggests that there were fluctuations in Mathematics performance over the three years, with a significant increase in 2021 and a small decline in 2022.

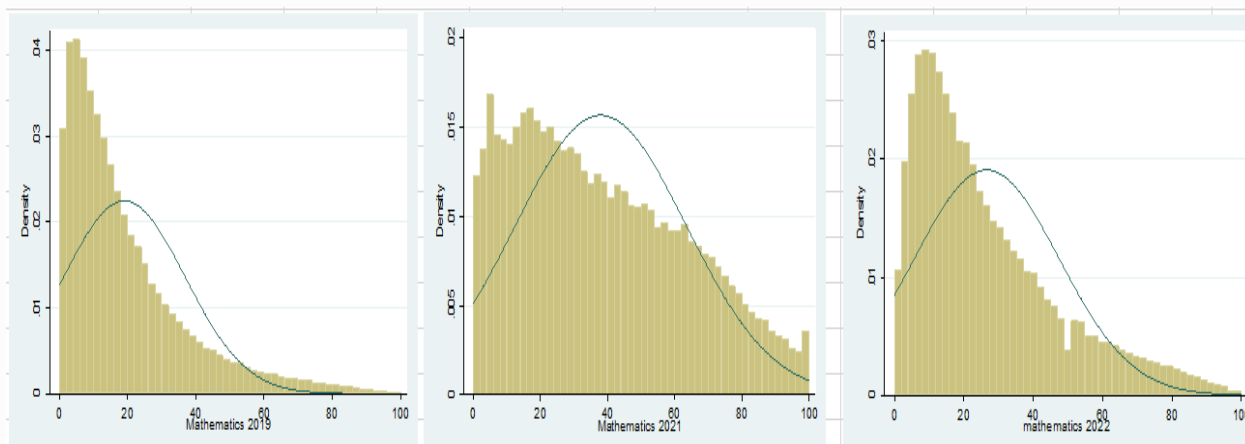


Figure 34: Distribution of Scores in S3 Mathematics

Figure 34 presents the distribution of scores in S3 Mathematics in a normal distribution curve for three years: 2019, 2021, and 2022. In 2019, the majority of students' scores were concentrated between 0 and 40, with a few scores above 40. This indicates that most students struggled with Mathematics in 2019, and only a few students performed well. Meanwhile, in 2021, the distribution of scores improved significantly, with the majority of students' scores concentration ranging from 0 to 80, and few scores above 80. This indicates that more students performed well in Mathematics in 2021 compared to 2019. Similarly, in 2022, the distribution of scores shifted again, with the majority of students' scores concentrated between 0 and 60, and a few scores above 60. This indicates that while Mathematics performance remained slightly higher compared to 2019, there was a slight decline in performance compared to 2021.

Overall, the data shows that students' performance in Mathematics improved consistently over the three years. It is also observed that there was improved students' performance in 2021 compared to 2019. However, there was a slight decline in performance in 2022 compared to the previous year (2021). The normal distribution curve shows that the distribution of scores got more spread out from the mean. The report from Chief examiner of S.3 Mathematics exam (2022) attributes the low performance in mathematics to the different factors such as language barrier, poor interpretation of some questions, and most questions required higher level of thinking, among others.

3.2.3 Pass rate in S.3 Mathematics by location

This section presents pass rate in S.3 Mathematics by province, districts, and rural and urban areas.

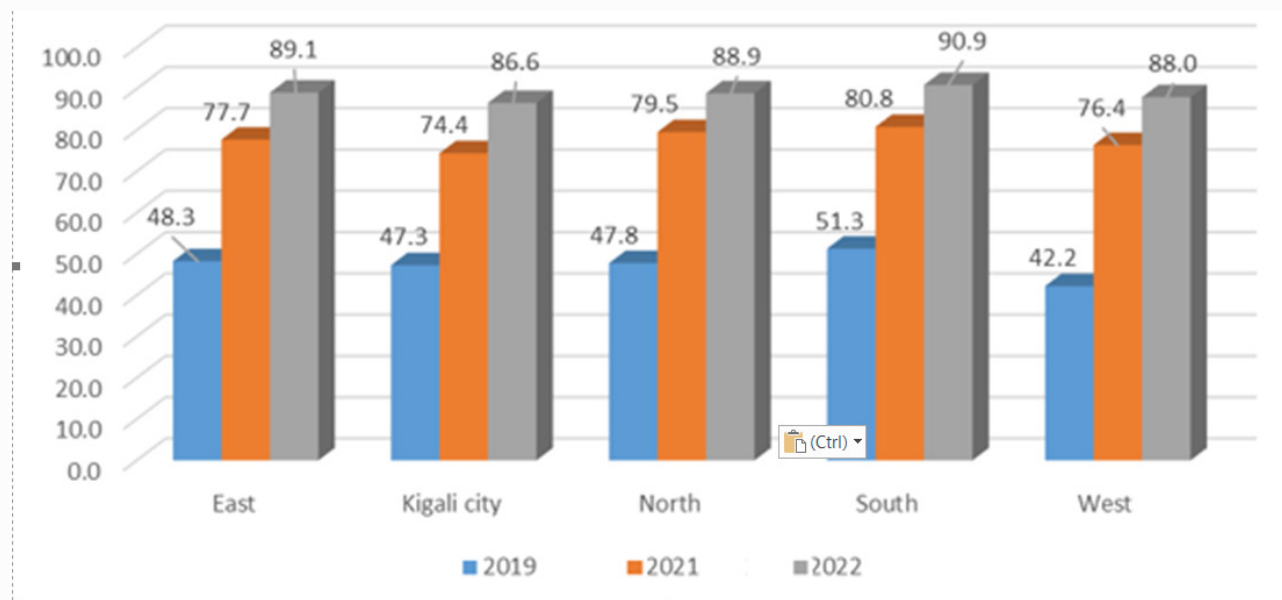


Figure 35: Pass rate in S.3 Mathematics by Province

Figure 35 represents the pass rate of S.3 students in Mathematics by province for three years: 2019, 2021, and 2022. In 2019, the overall pass rate for the four provinces and Kigali city was 47.4%. The province with lowest pass rate was the Western (42.2%) while Southern province had the highest (51.3%). This indicates that the pass rate in Mathematics varied significantly across the provinces in 2019. In 2021, the pass rate improved significantly in all the provinces and Kigali city, with the average pass rate of 78.2%. The highest pass rate was still in the Southern province (80.8%), while the lowest was in Kigali city (74.4%). In 2022, the pass rate in Mathematics further increased to an average of 89.0%. The highest pass rate was recorded in the South province (90.9%), while the lowest pass rate was for Kigali city (86.6%). This indicates that Mathematics pass rate continued to improve across the provinces and Kigali city.

Overall, the data shows that the pass rate in Mathematics improved remarkably across the provinces in Rwanda over the past three years. The Southern province consistently had the highest pass rate, while Kigali city consistently had the lowest pass rate. This suggests that measures were taken to improve teaching and learning of Mathematics though more efforts are needed to ensure that all the provinces achieve similar levels of pass rate.

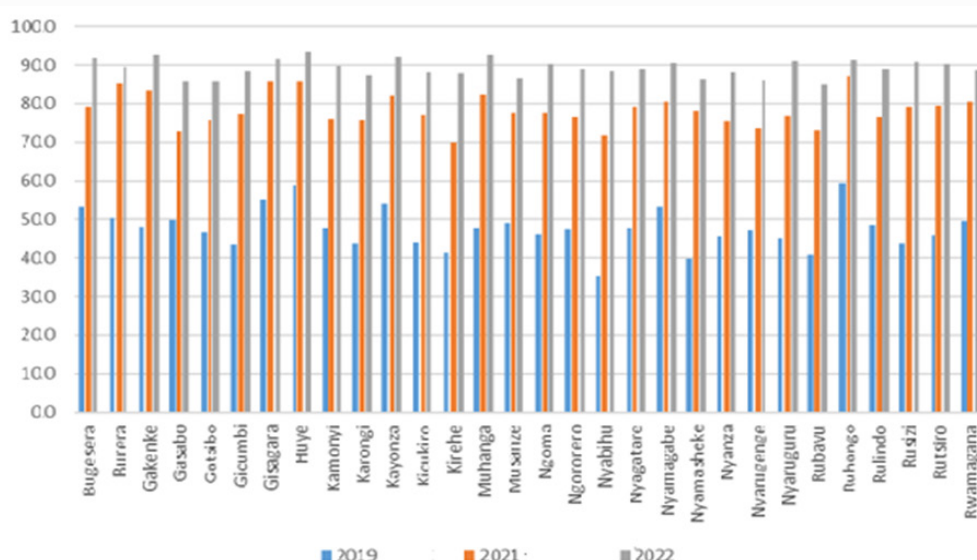


Figure 36: Pass rate in S.3 Mathematics by District

The figure 36 depicts the pass rate in S3 Mathematics by district for the years 2019, 2021, and 2022. Overall pass rate increased from 78.2% in 2019 to 89.0% in 2022. The districts with highest pass rate in S3 Mathematics in 2022 were Huye (93.5%), Bugesera (91.8%), and Gakenke (92.6%) while the districts with the lowest pass rate in 2022 were Nyabihu (88.3%), Nyarugenge (86.1%), and Nyamasheke (86.2%). Overall, the data indicates that there was a significant improvement in the pass rate in S3 students in Mathematics 2021 and 2022 in all the districts. Further study is necessary to establish factors that lead this increase in pass rate for sustainability.

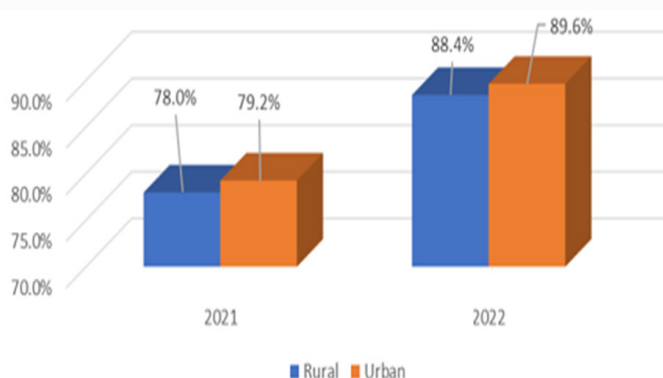


Figure 37: Pass rate in S.3 Mathematics in Rural and Urban schools

The data in Figure 37 show an improvement in the pass rate in mathematics of students from both rural and urban areas in Mathematics over the past two years. In 2021, the pass rate in rural schools stood at 78.0% while in urban schools it was 79.2%. In 2022, both rural and urban schools had a relatively higher pass rate of 88.4% and 89.6%, respectively than in 2021. The data indicates that the pass rate in both rural and urban schools improved, but those from urban places consistently had a slightly higher pass rate than students from rural areas in both years.

3.2.4 Pass rate in S.3 Mathematics by school ownership

The figure below shows the pass rate in S.3 mathematics according to school ownership (private, public and government aided).

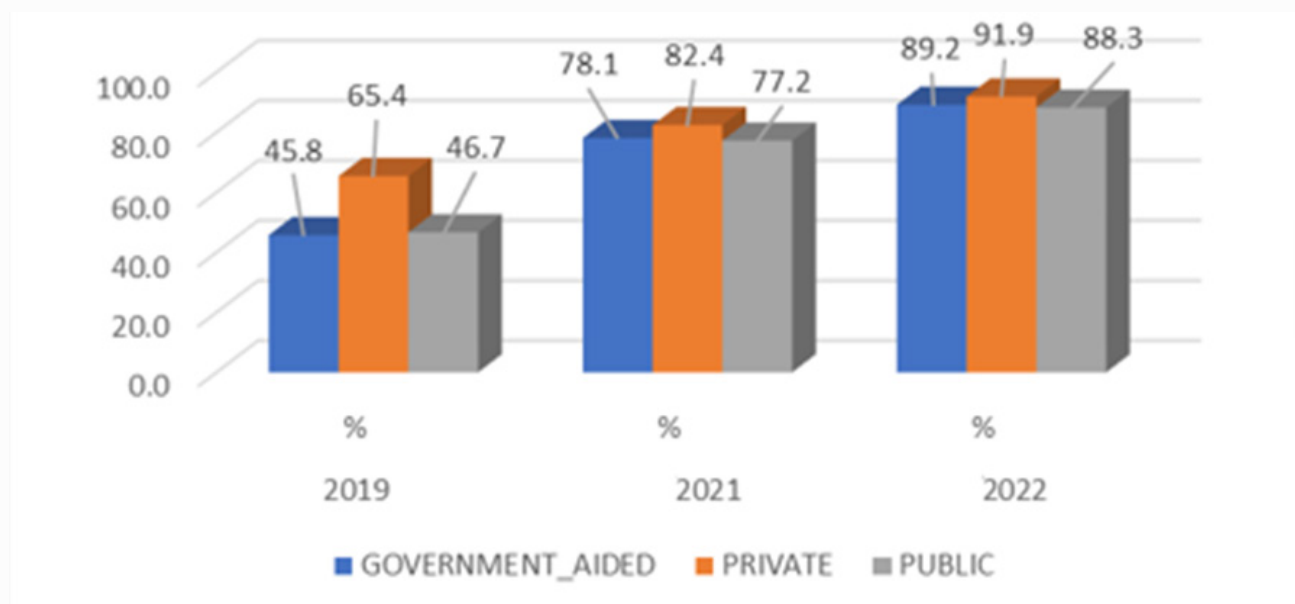


Figure 38: Pass rate in S.3 mathematics by school ownership

Figure 38 represent the percentage of students who passed Mathematics exam according to school ownership. The data shows that private schools consistently had the highest pass followed by government-aided schools with 89.2%, and public schools with 88.3%. Private schools consistently had the highest pass rate over the three years. It is also worth noting that in 2019 the pass rate for government-aided schools was significantly lower than that of private schools, which indicates that there was a considerable achievement gap between these two school ownership types. However, the gap reduced in 2021 and 2022.

3.2. 5 Pass rate in S.3 in Physics national exams

Analysis of S.3 Physic national examinations focused in the general pass rate, pass rate by gender, by location (province, district and rural-urban divide) as well as by school ownership.

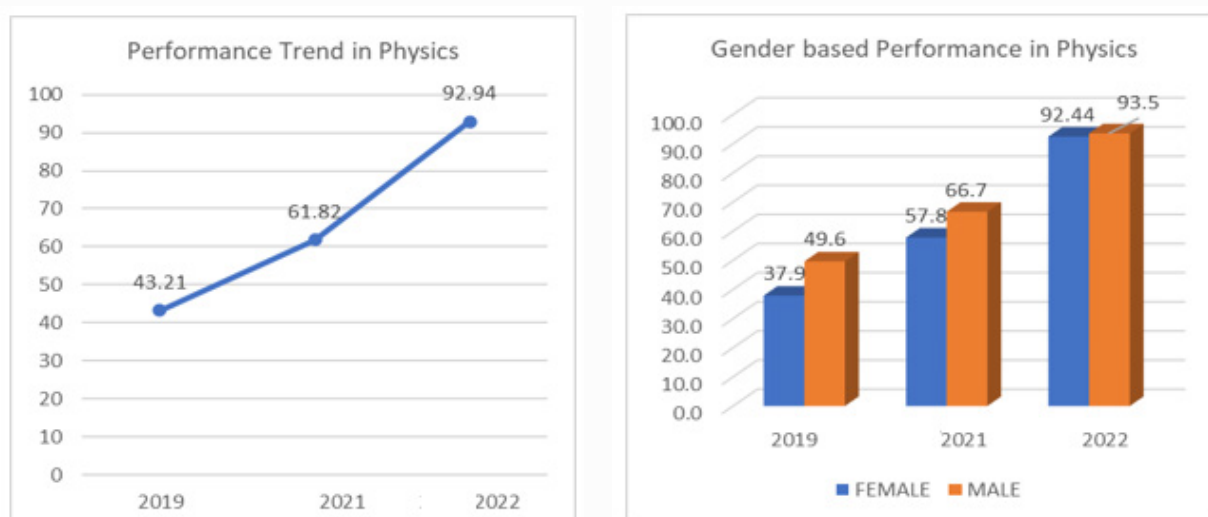


Figure 39: Pass rate in S.3 Physics exam in general and by gender

The data presented in the above figure shows the pass rate of S3 students in Physics for the three years (2019, 2021, and 2022). In 2019, the percentage of students who passed Physics exam was 43.21% while in 2021, the percentage of students who passed Physics exam increased from 43.21% (2019) to 61.82%. This represents a substantial improvement in the students' pass rate. In 2022, the percentage of students who passed Physics exam increased even further to 92.94%. This indicates a remarkable improvement in the performance of students in the subject. Disaggregated by gender, it was found that across the three years the pass rate amongst male students was relatively higher than female. This indicates that there was a gap in pass rate in relation to gender. Therefore, it is important to continue to monitor and address this gender gap to ensure that all students, regardless of gender, get equal opportunities to excel in Physics.

3.2.6 Mean, SD and VC of scores in S.3 Physics exam

The mean, SD and VC of student scores in Physics national exam for 2019, 2021 and 2022 were computed and the details are indicated in the table below.

Table 10: Mean, SD and VC of scores in S.3 Physics exam

	2019	2021	2022
Mean	17.4	21.8	20.1
SD	14.3	14.8	13.2
VC	82.5	67.9	65.6
N	114,423	121201	127190

The mean score for Physics increased from 17.4 in 2019 to 21.8 in 2021, but slightly decreased to 20.1 in 2022. This indicates an overall improvement in the performance of students in Physics from 2019 to 2021, and a slight decline in 2022. The SD and VC show that despite the improvement in performance, there was high variability in students' scores relative to the mean.

Overall, the data suggests that there was an improvement in the mean score and consistency of students' performance in Physics from 2019 to 2021, and a slight decline in 2022. However, the increase in the number of students taking the subject exam is a positive trend that may have contributed to the variability in the scores. Further analysis is needed to understand the factors that may have influenced the changes observed in the data.

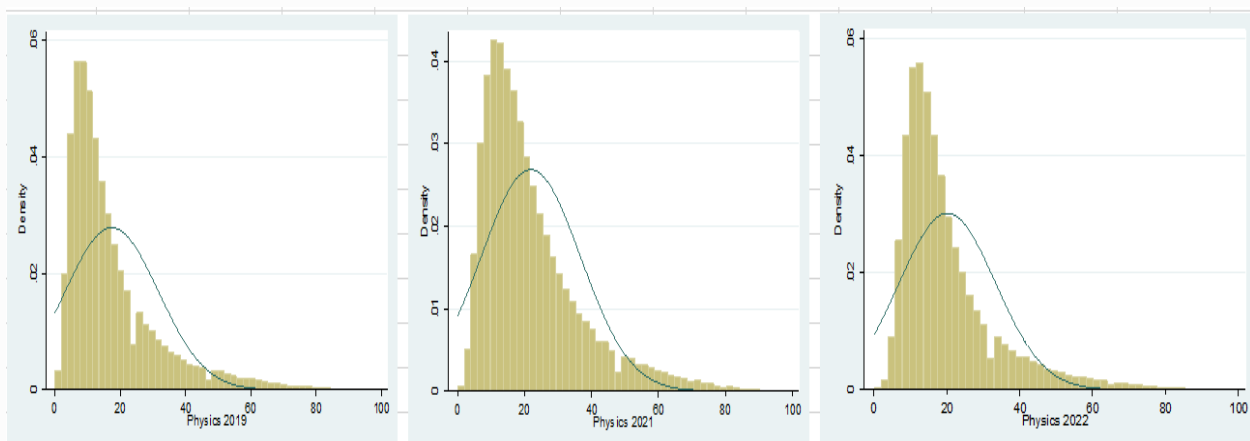


Figure 40: Distribution of Scores in S3 Physics Subject

Figure 40 indicates that the distribution of scores in Physics changed over the years. In 2019, the scores were concentrated between 5 and 20, with very few scores above 20. This suggests that the students' performance was low that year. However, in 2021, the scores were concentrated between 5 and 40, with a few scores above 40. This suggests that the students' performance improved significantly compared to 2019, with more students scoring higher marks. Similarly, in 2022, the scores were concentrated between 5 and 30, with a few scores above 30. The normal distribution curve shows that scores spread widely from the mean. According to the Chief examiner report, the poor performance of students should be attributed to the curriculum design because the content given to the learners does not match their level of understanding.

3.2.7 Pass rate in S.3 Physics exam by location

Analysis of pass rate by location involved province, district, and by rural and urban schools as indicated in the figure below.

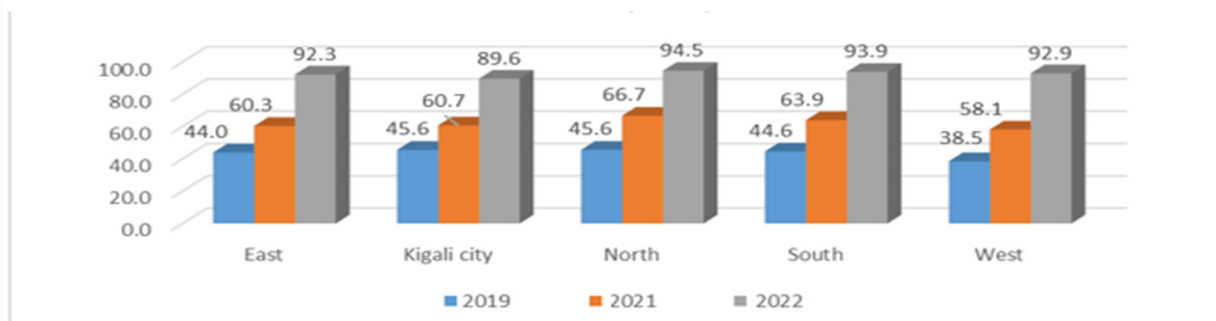


Figure 41: Pass rate in S.3 Physics exams by Province

In 2019, the overall average performance of all provinces was 43.2%, with the lowest score in the West (38.5%) and the highest score in Kigali city (45.6%). However, in 2021, the average pass rate increased to 61.8% for all provinces, with the lowest pass rate being observed the West (58.1%) and the highest in the North (66.7%). Furthermore, in 2022, the average pass rate increased further to 92.9% for all provinces, with the lowest score in Kigali City (89.6%) and the highest score in the North (94.5%). Overall, the students' pass rate increased significantly in in physics across all the provinces from 2019 to 2022. The Western province registered a particular increase from 38.5% in 2019 to 92.9% in 2022.

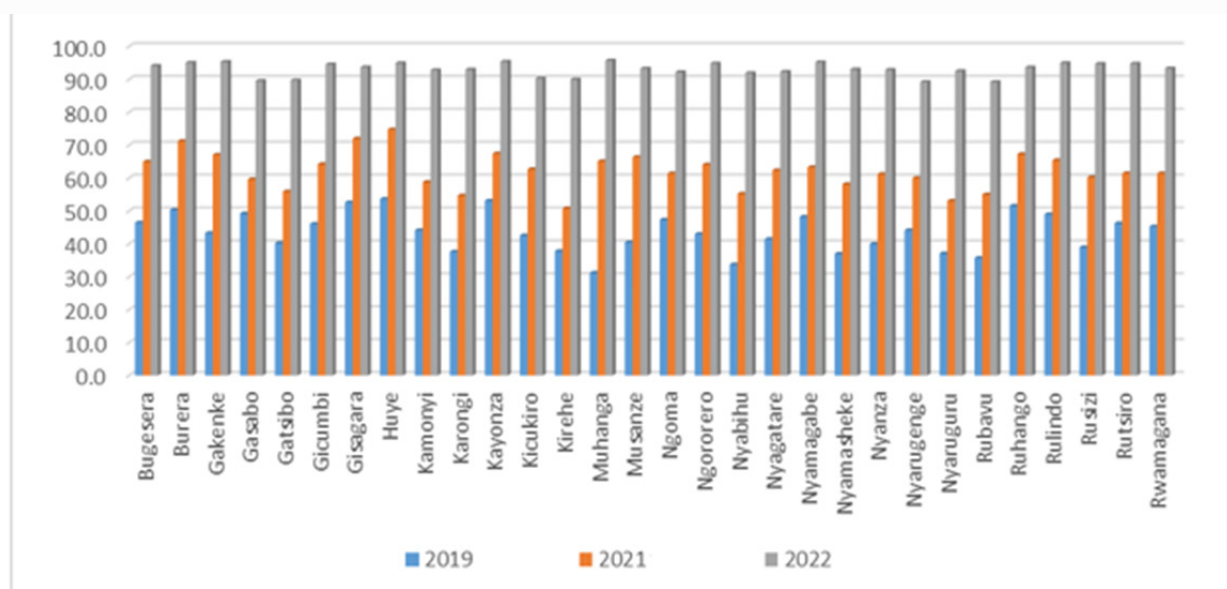


Figure 42: Pass rate in S.3 Physics Exam by District

The above figure shows that there was a general increase in the pass rate in 2021 and 2022 in all the districts. For instance, in 2022, Muhanga (95.7%), Kayanza (95.4%), Gakenke (95.3%), Nyamagabe (95.2%), and Burera (95%) districts pass rates were above 90%, while Nyarugenge and Rubavu districts had the lowest pass

rate of 89.2%. In 2021, Huye and Gisagara had the highest pass rate of students in Physics. The lowest pass rate was in Kirehe district.

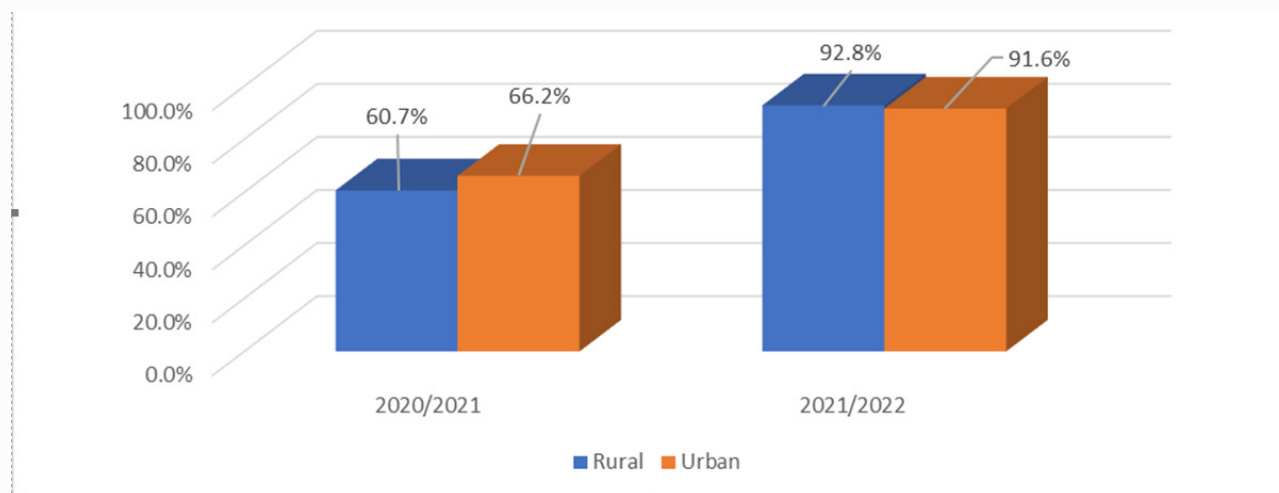


Figure 43: Pass rate in S.3 Physics exam in rural and urban schools

As can be seen in the above figure, the pass rate in urban schools was relatively higher than in rural schools in 2021. In 2021, student pass rate in rural schools was 60.7%, in urban it was 66.2%. Nevertheless, in 2022, there was no significant difference in pass rate between rural and urban schools and in both categories of schools, there was a very great increase in pass rate. There is need to find out what triggered such a substantial improvement so that the strategies and best practices can be shared across schools in the country.

3.2.8 Pass rate in S.3 Physics exam by school ownership

The categories of school ownership considered in the analysis included private, public and government aided as indicated in the figure below.

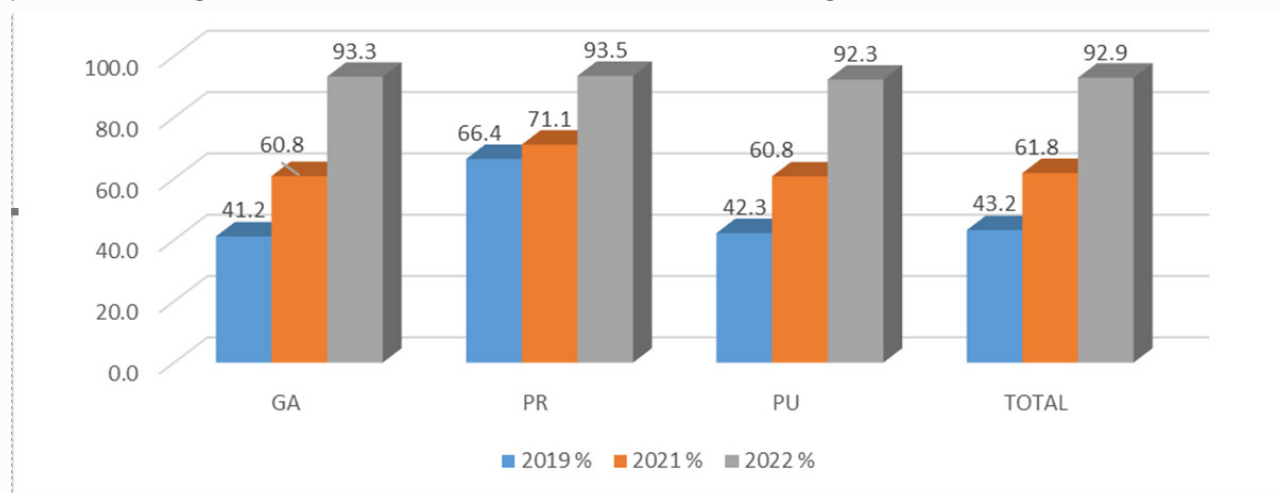


Figure 44: Pass rate in S.3 Physics exam by type of School Ownership

The figure above shows the students' pass rate in Physics by school ownership (Government-aided, Private, and Public). In 2019, private schools had the highest percentage (66.4 %) of students who passed Physics exams is followed by

Government-aided schools, with a percentage of 41.2% and public schools with 42.3%. In 2021, the total percentage of students who passed physics exam increased to 61.8% and Private schools had the highest percentage of 71.1%. Government-aided schools had public schools had 60.8% and 60.8% respectively. In 2022, the total percentage of students who passed Physics exam further increased to 92.9%. Overall, all the three school ownership categories improved in performance, but Private schools consistently performed better than Government-aided and public schools.

3.2.9 Pass Rate in S.3 Chemistry National Examination

Like other subjects, analysis of S.3 Chemistry national examinations results focused in the general pass rate, pass rate by gender, by location (province, district and rural-urban divide) as well as by school ownership.

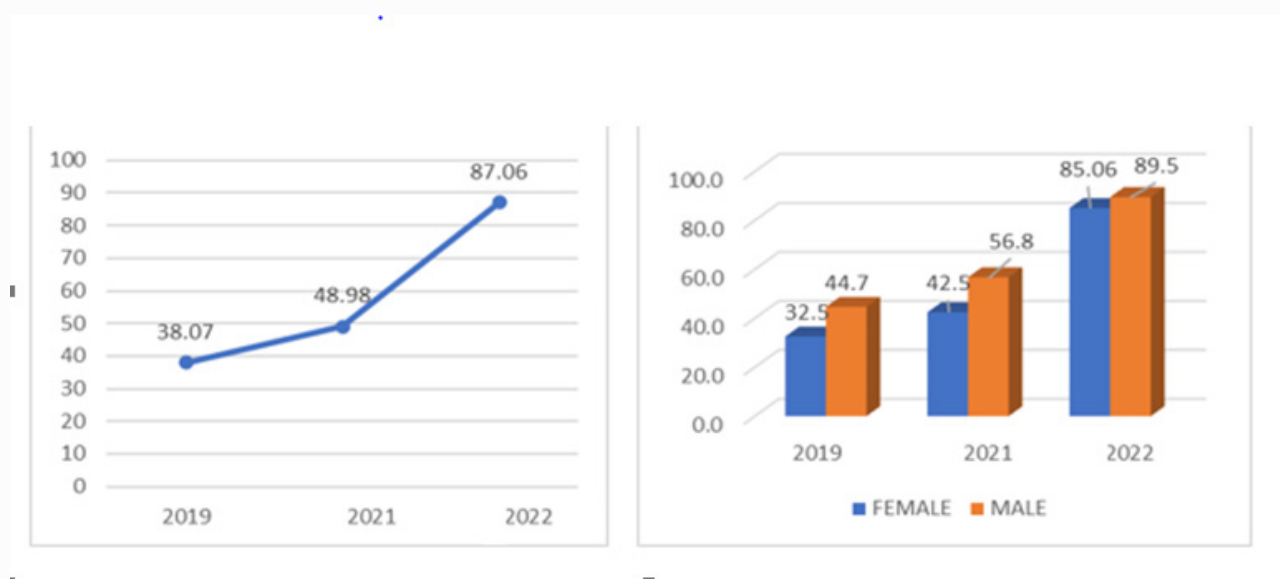


Figure 45: General pass rate in S.3 Chemistry exam and pass rate by gender

As depicted in Figure 45, the pass rate in Chemistry in 2019 was generally low (38.07), but it increased to 48.98% in 2021 and to 87.6% in 2022. The pass rate of male students was significantly higher than that of female especially in 2019 and 2021. In 2022, there was a slight difference, but still the pass rate male (89.5%) was higher compared with female (85.065). This suggests that efforts were made in improving the teaching and learning of Chemistry in 2022.

3.2. 10 Mean, SD and VC of scores in S.3 Chemistry exam

The table below presents the Mean, SD and VC of scores in S.3 Chemistry national examination.

Table II: Mean, SD and VC of score in Chemistry

	2019	2021	2022
Mean	19.27	16.55	20.94
SD	16.44	17.27	16.94
VC	85.32	104.30	80.89
N	114,423	121201	127176

The mean scores show that students' performance in chemistry was generally low across the three years. For instance, in 2019 the mean score was 19.27, in 2021 and 2022 it was 16.55 and 20.94 respectively. Moreover, there was high variability in scores for all the years as depicted by the SD and CV. This means that the minimum range of scores at which students were considered to have passed was low.

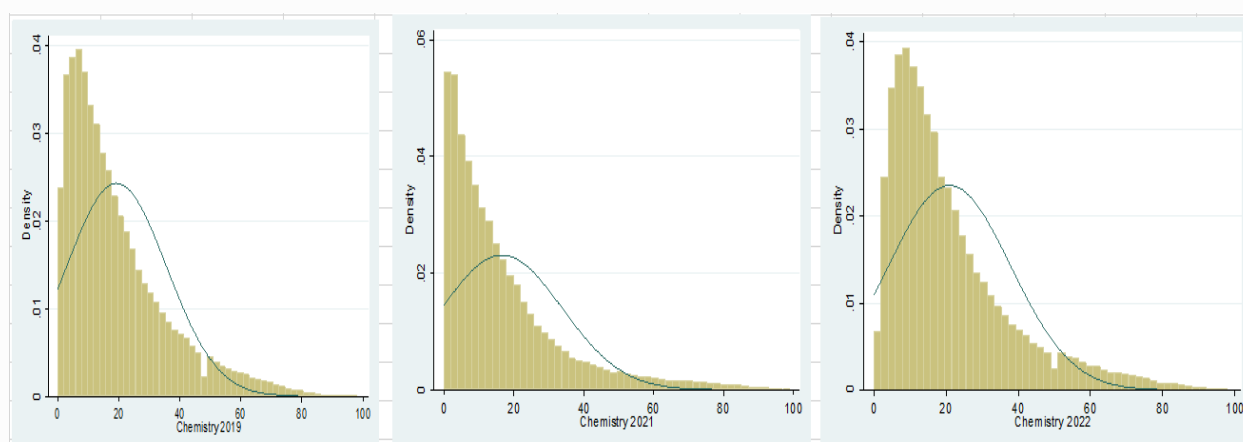


Figure 46: Distribution of Scores of S.3 Chemistry exam on normal distribution curves

Figure 46 shows that for all the three years, the normal distribution curves are right skewed with low mean and majority of the scores spread on the left and a few on the right. This means the performance was generally poor for most of the students and a few of them performed well, but with a greater variability in scores.

3.2.11 Pass rate in S.3 Chemistry by location

Student pass rate in chemistry was analysed by location, that is, by province, rural –urban divide and by district. The figure below shows pass rate by province.

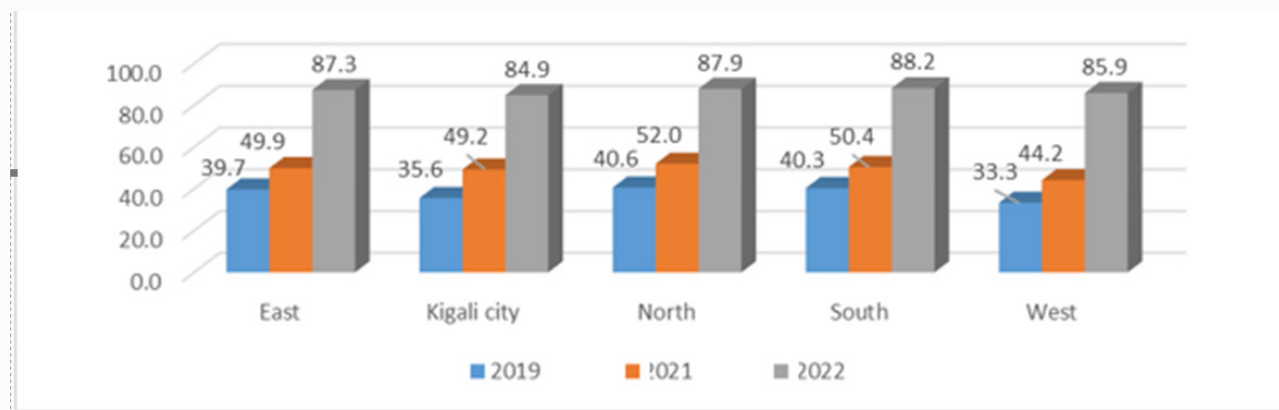


Figure 47: Pass rate in S.3 Chemistry by Province

Figure 45 shows the pass rate of S3 students in chemistry in different provinces of Rwanda for three consecutive years: 2019, 2021, and 2022. In 2019, the overall average pass rate of all provinces and Kigali city was 38.1%, with the lowest score in the West (33.3%) and the highest score in the North (40.6%). However, in 2021, the average pass rate increased to 49.0% for all provinces, with the lowest score in the West (44.2%) and the highest score in the North (52.0%). Furthermore, in 2022, the average pass rate improved further to 87.1% for all provinces, with the lowest score in Kigali city (84.9%) and the highest score in the South (88.2%). Compared with Physics the overall pass rate in chemistry was slightly lower than that of physics in all years.

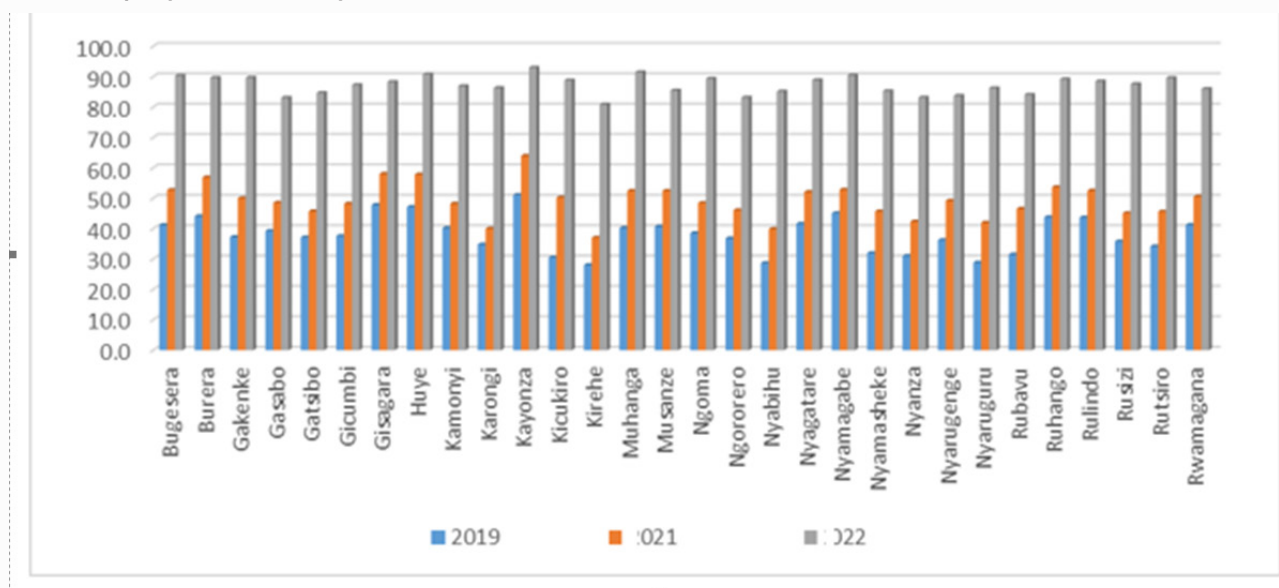


Figure 48: Pass rate in S.3 Chemistry by District

Figure 48 shows that the students' pass rate in Chemistry improved across all the districts in 2021 and 2022. The district with the highest pass rate in all the three years was Kayonza. Kirehe and Nyaruguru districts consistently had the lowest pass rate from 2019 to 2022. Overall, we can see that most districts in Rwanda made significant improvement in S3 Chemistry performance over the past three years. However, there is still room for improvement in some districts, particularly Kirehe and Nyaruguru.

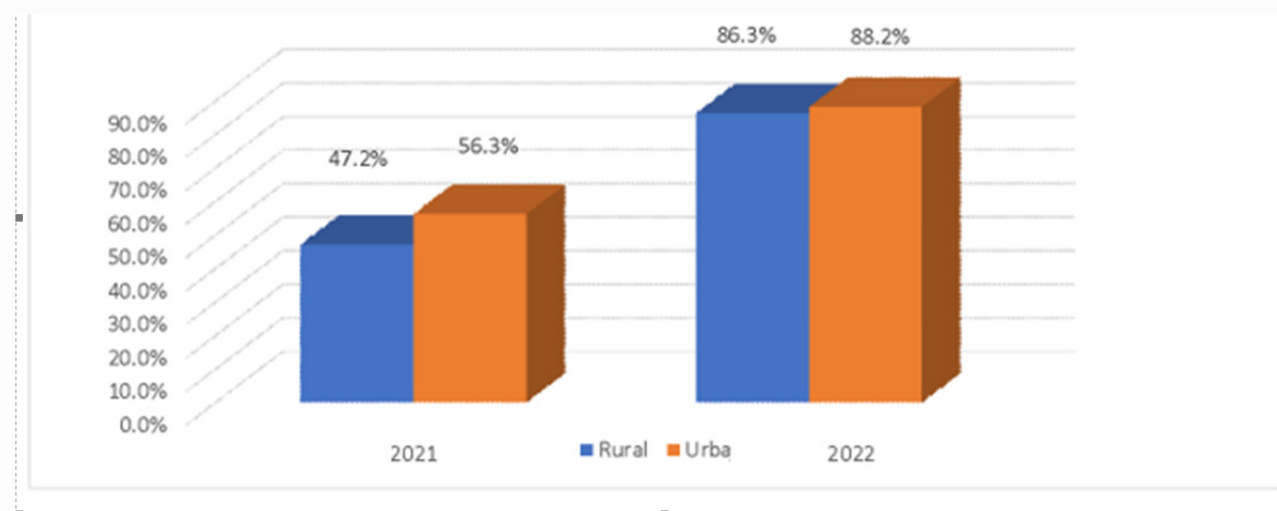


Figure 49: Pass rate in S.3 Chemistry exam in Urban and Rural schools

As can be seen in Figure 49, in 2021, students in rural areas had a pass rate of 47.2%, while students in urban areas had a pass rate of 56.3%. In 2022, the pass rates for both rural and urban students significantly increased to 86.3% and 88.2%, respectively. The data indicates that both rural and urban students made substantial progress in their Chemistry performance, with urban students achieving a slightly higher pass rate in 2022 than rural students. This may suggest that efforts to improve Chemistry education in both rural and urban areas had a positive impact. However, it's important to note that the pass rate for both rural and urban students in 2021 was relatively low, indicating that there may be challenges in the teaching and learning of Chemistry. The significant improvement in performance in 2022 for both rural and urban students could be attributed to interventions aimed at addressing these issues, such as increased investment in education infrastructure and teacher training programs.

3.2.12 Pass rate in S.3 Chemistry national exam by school ownership

The categories of school ownership considered in the analysis of S.3 national chemistry exam included private, public and government aided as indicated in the figure below

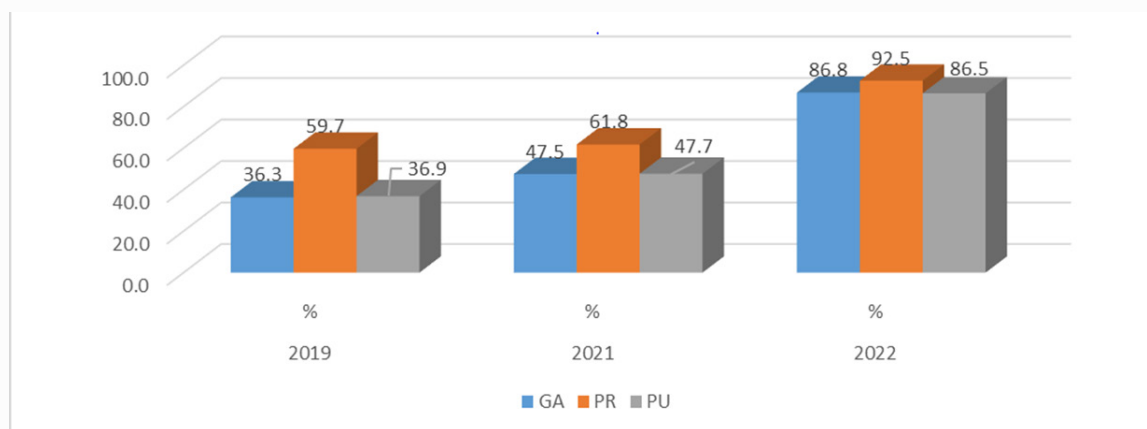


Figure 50: Pass rate in S.3 Chemistry based on School Ownership

The figure above shows the students' pass rate in chemistry by school ownership (Government-aided, Private, and Public). Overall, the pass rate in private schools was higher than in public and government aided. In 2019, private schools had the pass rate in private schools was 59.7% while in public and government aided it stood at 36.9% and 36.3% respectively. The trend of pass rate was similar in 2021 and 2022.

3.2.13 Pass Rate S.3 Biology National Examination

Analysis of S.3 Biology national examinations results focused on the general pass rate, pass rate by gender, by location (province, district and rural-urban divide) as well as by school ownership. The figure below indicates general pass rate in Biology national exam for 2019, 2021 and 2022.

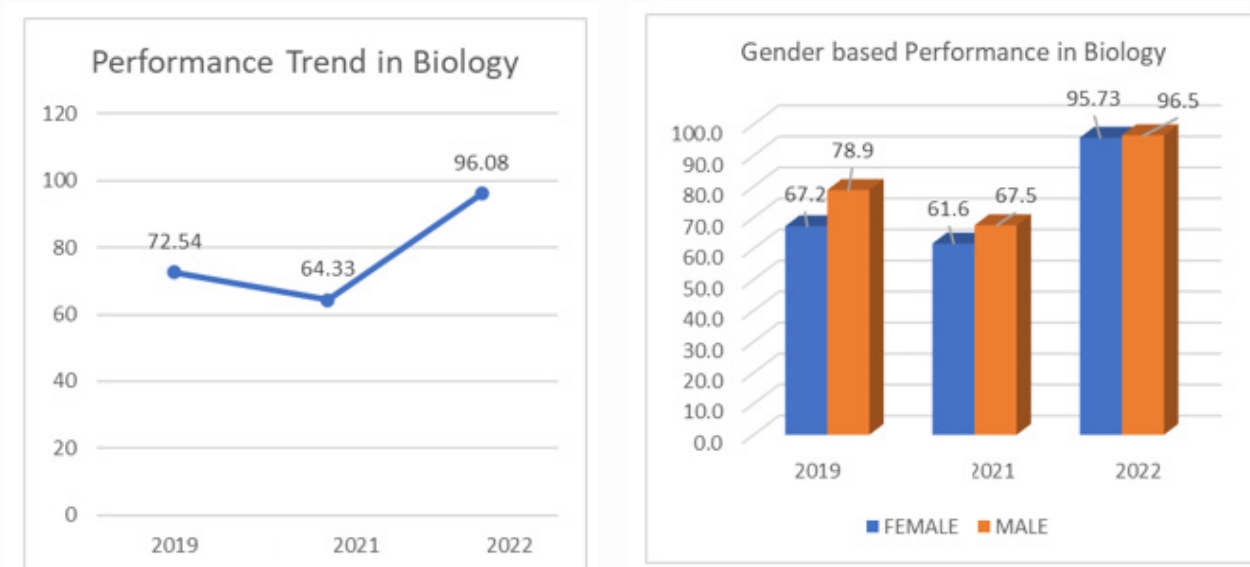


Figure 51: General pass rate in Biology and pass rate by gender

According to Figure 51, the general pass rate in biology over the academic years 2019, 2021, and 2022, was 72.54%, 64.33%, and 96.08%, respectively. There was a significant decrease in the pass rate from 72.54 % in 2019 to 64.33% in 2021, but it sharply increased to 96.08 in 2022. This suggests that students may have faced greater challenges or difficulties in the academic year 2021 that impacted their performance.

3.2.14 Mean, SD and CV of scores in S.3 Biology national exam

The table below presents the Mean, SD and VC of scores in S.3 Biology national examination.

Table 12: Mean, SD and CV of scores in S.3 Biology national exam

	2019	2021	2022
Mean	31.67	32.21	33.1
SD	17.31	20.09	17.87
VC	54.64	62.37	54.01
N	114,423	121201	127171

As evidenced by the mean scores, students' performance in Biology was generally fair across the three years compared to other science subjects such as chemistry and physics. Moreover, there was less variability in scores for all the years as depicted by the SD and CV. This means that the minimum range of scores at which students were considered to have passed was higher than in other science subjects.

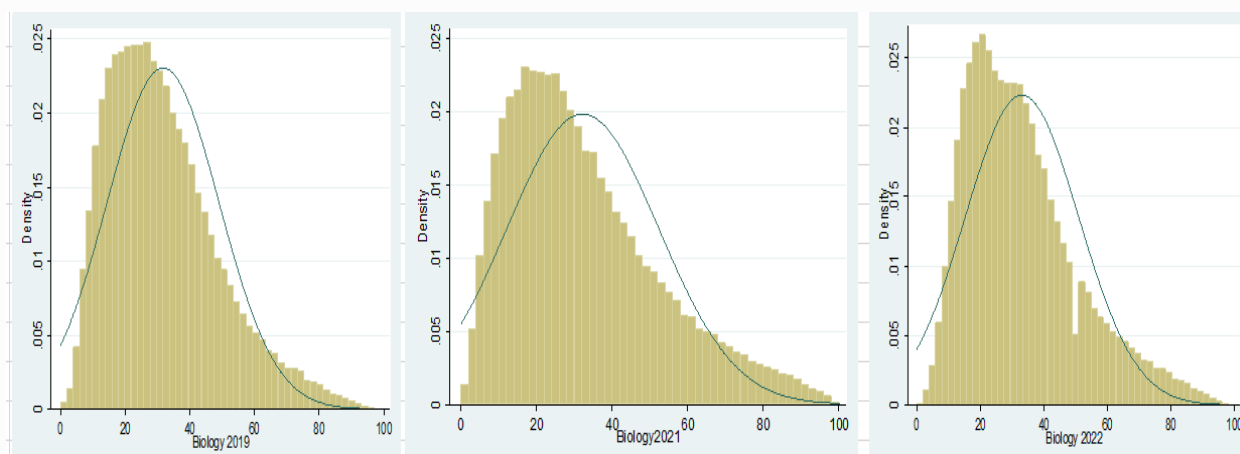


Figure 52: Distribution of Scores in S3 Biology exam on a normal curve

Figure 52 shows that for all the three years, the normal distribution curves are less right skewed with fair and the scores spread fairly around the mean. This means the performance was generally fair for most of the students, but a few of them performed well and with less variability in scores.

3.2.15 Pass rate in S.3 Biology exam by location

During the analysis of students pass rate in Biology by location, focus was in province, rural -urban divide and by district. The figure below shows pass rate by province.

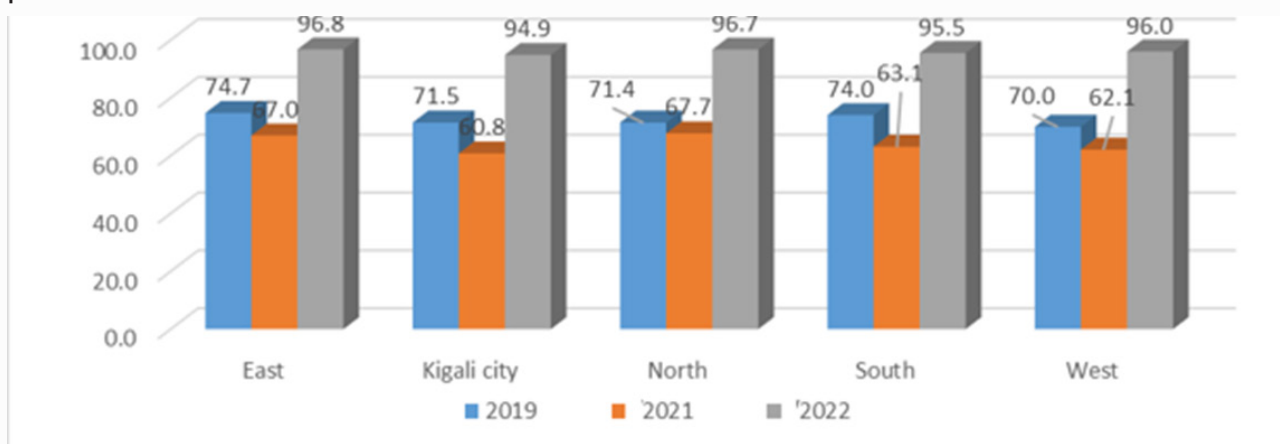


Figure 53: Pass rate in S.3 Biology exam by Province

From the figure above, the average pass rate in provinces including Kigali city was 72.5%. The lowest pass rate was in Kigali city (71.5%) and the highest in the East (74.7%). However, in 2021, the average pass rate in all the provinces and Kigali city decreased to 64.3%, with the lowest pass rate observed in Kigali city (60.8%) and the highest in the North (67.7%). Nonetheless, the pass rate in 2022, the average performance improved to 96.1% for all provinces, with the lowest score in Kigali city rose to 94.9%, but the highest was in the East (96.8%).

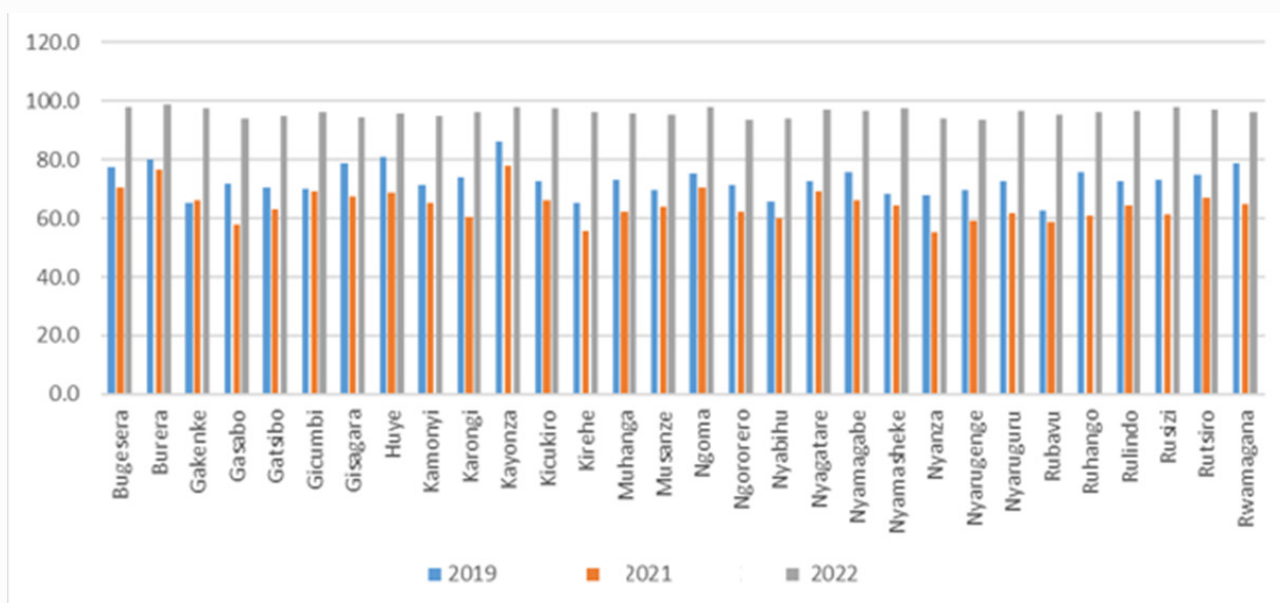


Figure 54: Pass rate in S.3 Biology exam by District

It is clear from the figure above that the district with the highest pass rate in Biology in 2022 was Kayonza with 98.0%, followed closely by Burera with 98.7% and Ngoma with 98.0%. The district with the lowest pass rate was Gasabo with 94.1%. Comparison of performance among the districts over the three years shows an increase in the pass rate from 2019 to 2022, with some districts making significant improvement. For example, Bugesera's pass rate increased from 77.3% in 2019 to 97.7% in 2022, while Nyabihu from 65.5% to 93.9%. However, some districts showed a decrease 2019 to 2021, such as Gasabo whose pass rate decreased from 72.0% to 57.7%. Nonetheless, all the districts showed a substantial increase especially in 2021 and 2022.

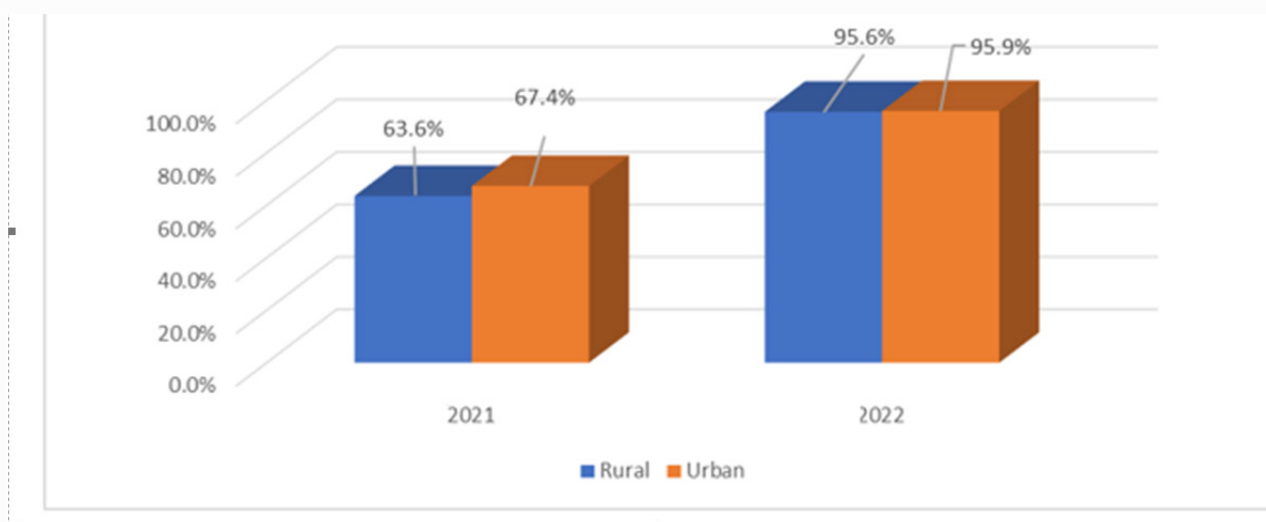


Figure 55: Pass rate in S.3 Biology exam in rural and urban schools

The data shows a significant improvement in the pass rate in rural and urban students in Biology in 2022. In 2021, the pass rate in rural schools was 63.6%, while urban it was 67.4%. In 2022, the pass rates in both rural and urban schools increased significantly to 95.6% and 95.9%, respectively. The data indicates that both rural and urban students made remarkable progress in their biology performance, with urban students achieving a slightly higher pass rate than rural students in 2022. This may suggest that efforts to improve Biology education in both rural and urban areas are having a positive impact. The significant improvement in performance in 2022 for both rural and urban students could be attributed to interventions aimed at addressing the challenges that existed in the teaching and learning of Biology in the previous year.

3.2.16 Pass Rate in S.3 Biology exam by type of School Ownership

In analyzing pass rate in S.3 Biology exam by school ownership, emphasis was put on private, public and government aided as indicated in the figure below.

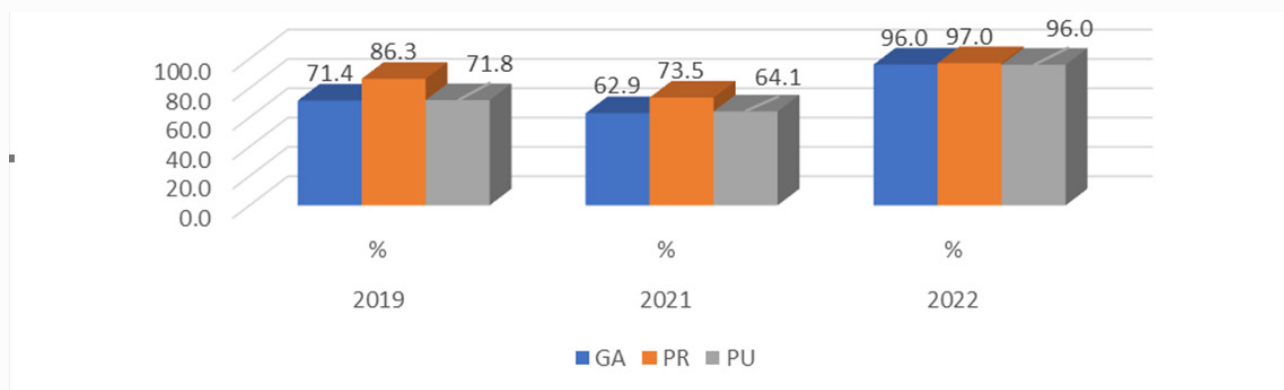


Figure 56: Pass rate in S3 Biology exam by type of school ownership

From the figure above, in 2019, the highest percentage of students who passed S3 Biology was in the Private schools (86.3%). This was followed by the Government-aided schools with a percentage of 71.4%. The Public schools had the lowest proportion of students who passed (71.8%). In 2021, there was a decline in the average pass rate of schools in S3 Biology (64.3%). The Private schools had the highest percentage of students who passed, with a percentage of 73.5%. The Government-aided and public schools' categories both saw a decline in performance, with the percentage of students who passed decreasing to 62.9% and 64.1%, respectively. In 2022, the Total percentage of students who passed S3 Biology increased to 96.1%, which is higher than the percentage in 2019. This indicates a significant improvement in the performance of schools in S3 Biology. The Private schools' category still had the highest percentage of students who passed, with a percentage of 97.0%. The Government-aided and public schools' categories both saw a significant improvement in performance, with the percentage of students who passed increasing to 96.0% for both categories.

Overall, the data suggests that there is a correlation between the ownership of a school and the performance of students in S3 Biology, with Private schools consistently performing better than Government-aided and public schools. However, it is also clear that all school categories have shown significant improvements in the past year, resulting in high percentages of students who passed S3 Biology in 2022. Further analysis is needed to understand the factors that contribute to the performance differences among different school ownership types in Biology.

3.2.17 Pass Rate in S.3 Geography National Examination

Analysis of S.3 Geography national examinations results focused on the general pass rate, pass rate by gender, by location (province, district and rural-urban divide) as well as by school ownership. The figure below indicates general pass rate in Biology national exam for 2019, 2021 and 2022.

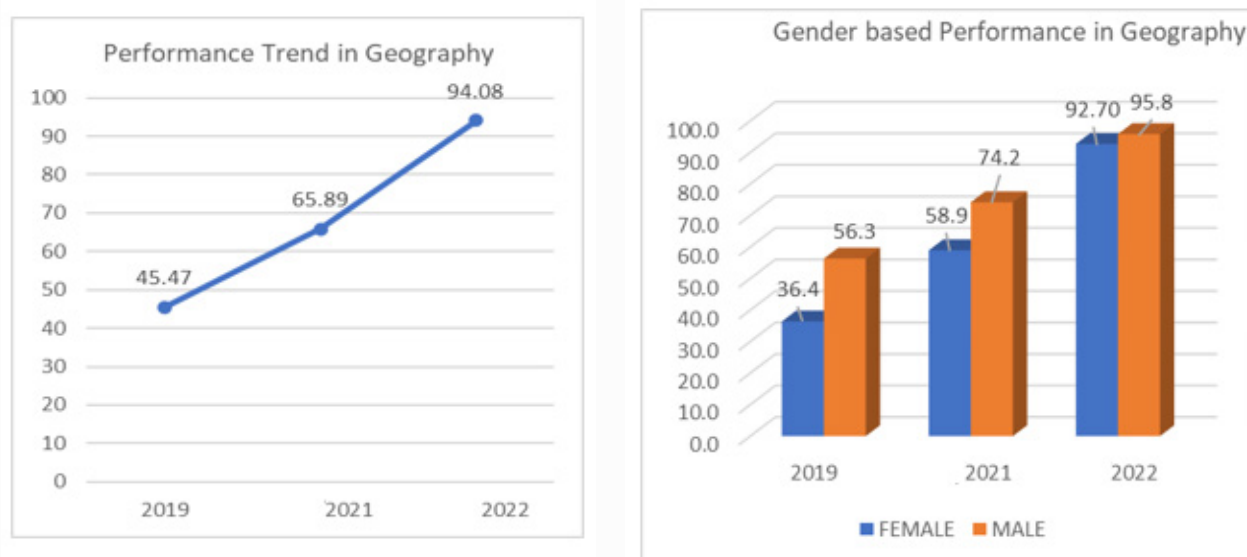


Figure 57: General pass rate in Geography and pass rate by gender

The data presented in Figure 57 shows the pass rate in Geography over the three consecutive years, 2019, 2021, and 2022. In 2019, the performance in Geography was at 45.47%. This indicates that less than half of the students who took the geography exam in that year passed the exam. However, there was a significant improvement in pass rate in the subsequent year, 2021, with a recorded percentage of 65.89%. This is an increase of 20.42% from the previous year. In the latest year, 2022, there was an even greater improvement in performance, with a recorded percentage of 94.08%. This is an increase of 28.19% from the previous year and a 48.61% increase from the initial year.

In terms of gender, the pass rate of male was better than female in Geography in all the three years. The data suggests that there has been a consistent improvement in the performance of both males and females in Geography over the three years. The performance gap between males and female has also decreased significantly, with both genders performing equally well in the latest year.

3.2.18 Mean, SD and CV of scores in S.3 Geography

The table below presents the Mean, SD and VC of scores in S.3 Geography national examination.

Table 13: Mean, SD and CV of scores in S.3 Geography

	2019	2021	2022
Mean	21.72	27.00	38.28
SD	16.86	19.43	19.62
VC	77.65	71.96	51.26
N	114,423	121201	127730

Table 13 shows the average score, standard deviation (SD), variation coefficient (VC), and number of students (N) for Geography exams over three consecutive years, 2019, 2021, and 2022. The mean score increased from 21.72 in 2019 to 27.00 in 2021 and to 38.28 in 2022. This suggests that students' performance in Geography improved. However, despite the increase in performance, the spread out of scores from the mean also increased as indicated by the SD and CV. The standard deviation increased slightly over the three years, from 16.86 in 2019 to 19.43 in 2021 and 19.62 in 2022.

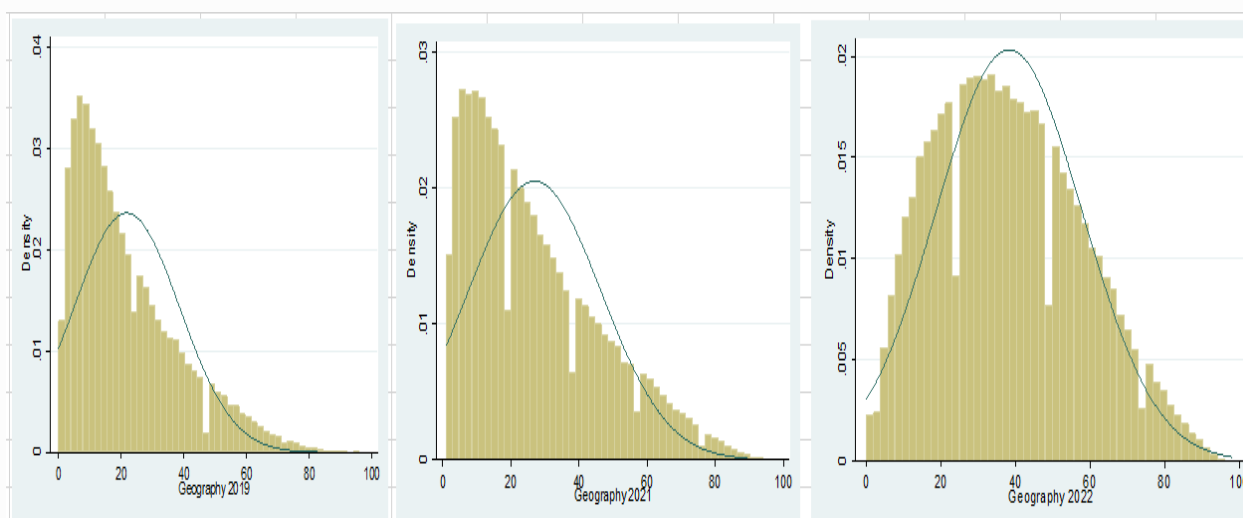


Figure 58: Distribution of Scores in S3 Geography exam on normal curve

As indicated the distribution of scores in S3 Geography on normal curves varied. In 2022, it was symmetrical with students fairly distributed on the normal distributed curve while in 2019 and 2021 the curves are right skewed with more scores on the left and a few on the right. This means that student performance was poor and this is evidenced by the low mean scores earlier presented in Table 13.

3.2.19 Pass rate in Geography by location

As earlier mentioned, analysis of pass rate by location focused on province, rural-urban divide and by district. The figure below shows pass rate by province.

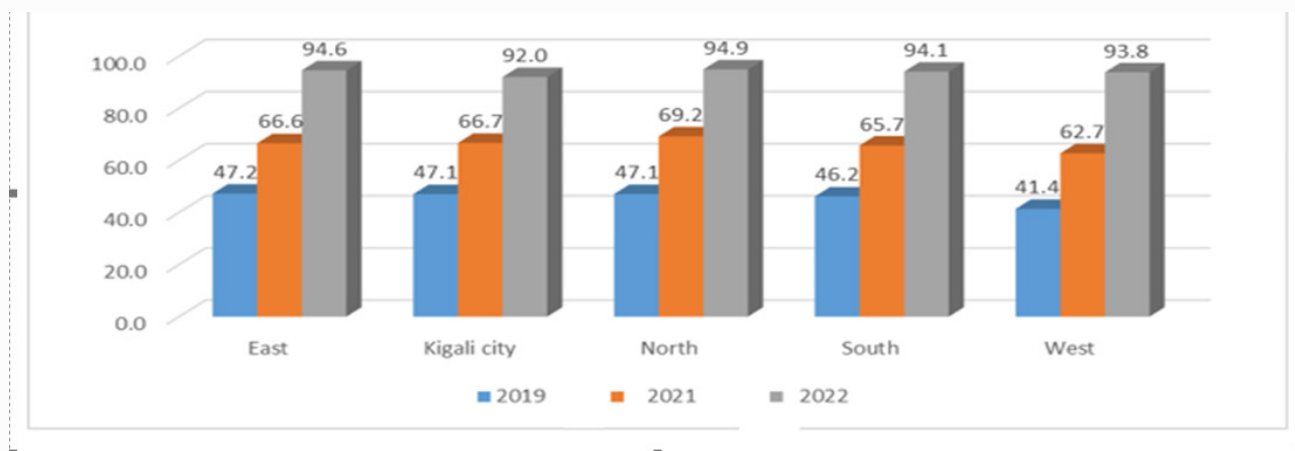


Figure 59: Pass rate in S.3 Geography by Province

Figure 57 shows the performance of S3 students in geography in different provinces of Rwanda for three consecutive years: 2019, 2021, and 2022. The percentage score of each province is given for each year. In 2019, the average pass rate of all provinces was 45.5%, with the lowest score registered in the West (41.4%) and the highest score in the East (47.2%). In 2021, the average performance improved to 65.9% for all provinces, with the lowest score in the West (62.7%) and the highest score in the North (69.2%). Furthermore, in 2022, the average pass rate improved further to 94.1% for all provinces, with the lowest score for Kigali city (92.0%) and the highest score for Eastern province (94.6%). The improvement is most remarkable in the Western Province, with an increase in performance from 41.4% in 2019 to 62.7% in 2021 and a further increase to 93.8% in 2022.

Overall, the pass rate in 2022 was high across all provinces, and Kigali city, though Kigali city had the lowest pass rate (92.0%). However, as with the other subjects, further analysis is needed to identify the reasons for the fluctuations and develop appropriate strategies to maintain high levels of performance.

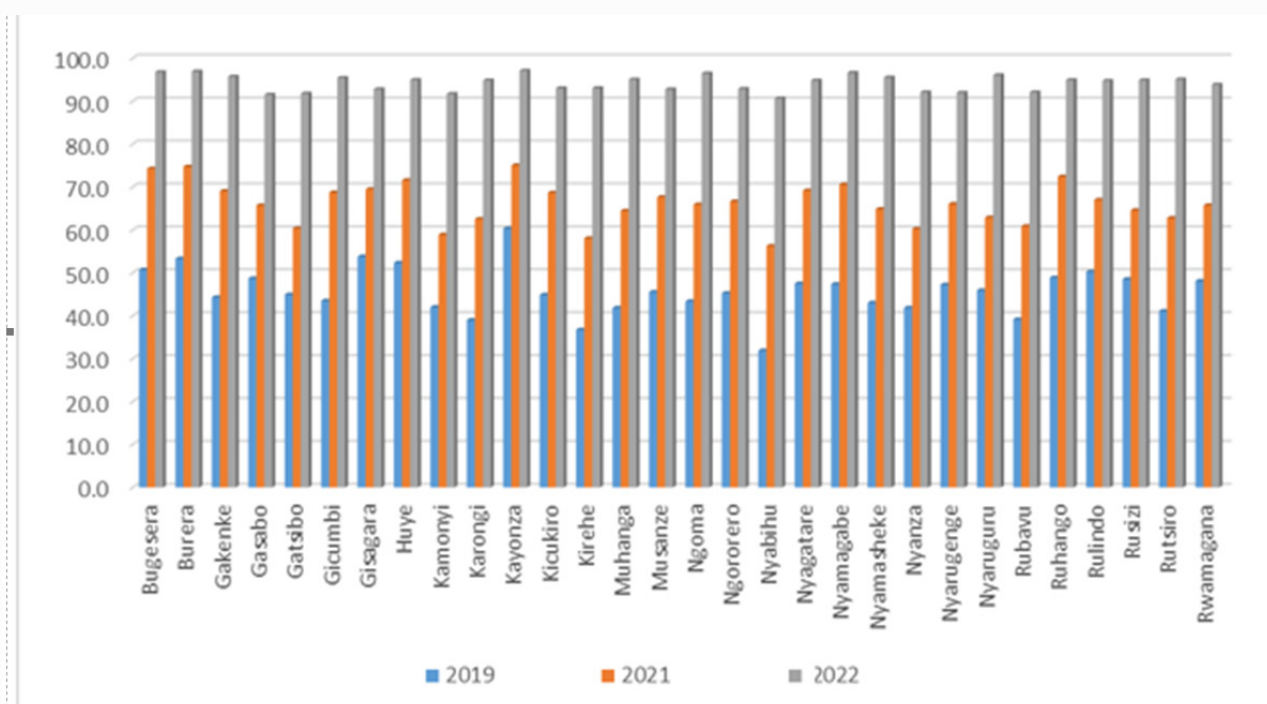


Figure 60: Pass rate in S.3 Geography by district

The data presented in the figure above shows the percentage scores for each district in three consecutive years: 2019, 2021, and 2022. The analysis enables us to compare students' performance among districts. In general, the total percentage score for all the districts was 83.4% in 2019, which decreased to 65.9% in 2021 and slightly improved to 94.1% in 2022. In 2022, the top-performing districts were Kayanza (97.1%), Bugesera (96.7%), Burera (96.9%), and Nyamagabe (96.6%). These districts consistently performed well across all the three years. Low-performing districts were Nyabihu (31.9%, 56.2%, and 90.6%) and Kirehe (36.7%, 58.0%, and 93.0%). As it appears, some districts achieved a significant improvement in their percentage scores from 2021 to 2022. For instance, Bugesera improved by 22.4%, Burera by 22.2%, and Gakenke by 26.6%. While some districts improved on their performance, others showed a decrease in their percentage scores from 2021 to 2022. For example, Kicukiro decreased by 5.6%, Ngororero by 3.4%, and Nyamagabe by 6.0%.

Overall, the data indicates that there was a decline in district performance from 2019 to 2021, followed by a slight improvement in 2022. However, there were variations in performance across different districts. Some performed consistently well and others performed consistently poorly. Additionally, some districts showed great improvement, while others showed a decline in their scores from 2021 to 2022.

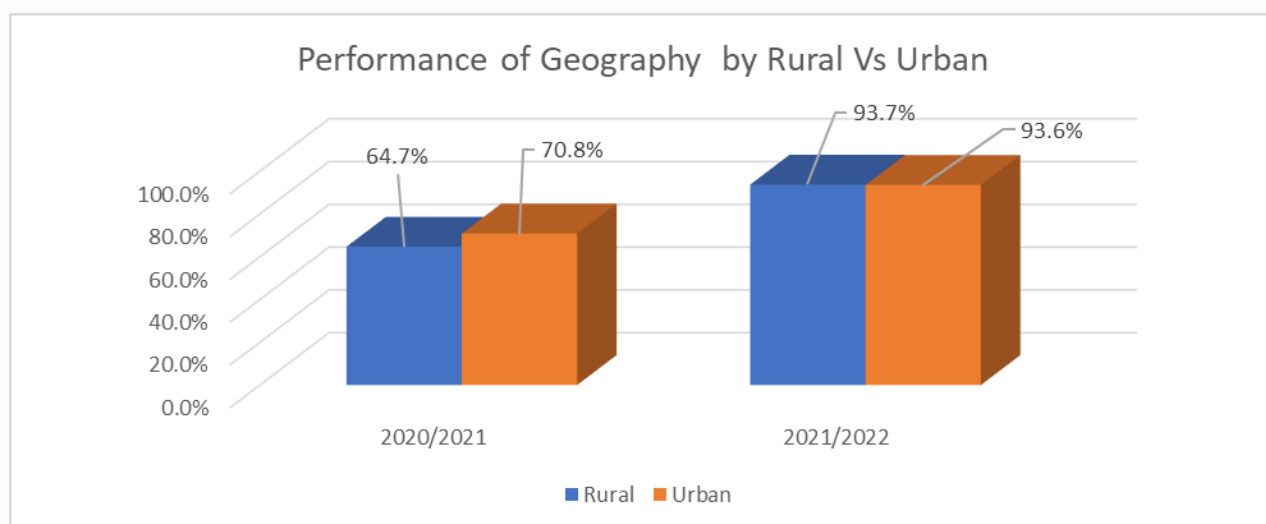


Figure 61: Pass rate in S.3 Geography in rural and urban schools

The pass rates for Geography over the past two years indicate, an overall improvement in pass rate in rural and urban schools. In 2021, the pass rate for rural areas was 64.7% while urban areas had a slightly higher pass rate of 70.8%. However, in 2022, there was a slight decrease in pass rates for both rural and urban areas. Rural areas had a pass rate of 93.7% whereas urban areas had a pass rate of 93.6%. Although there was a decrease in pass rates, both rural and urban areas still had a high pass rate, even though urban areas had a slightly higher pass rate than rural areas in the two years.

3.2.20 Pass rate in Geography by school ownership

The figure below shows the pass rate in S.3 Geography exam by type of school ownership.

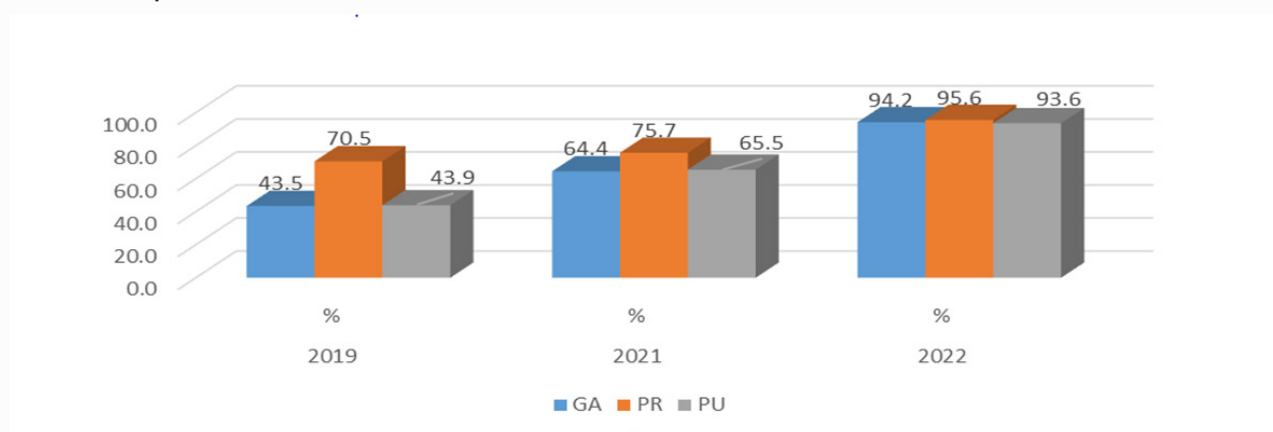


Figure 62: Pass rate in S.3 Geography by type of ownership

The figure above shows that private schools consistently performed better in Geography than government-aided or public schools. In 2019, the average pass rate in Geography was 70.5% for private schools, 43.5% for government-aided schools, and 43.9% for public schools. Similarly, in 2021, private schools had the highest average performance of 75.7%, followed by government-aided schools

with 64.4%, and public schools with 65.5%. The trend continued in 2022, whereby private schools recorded the highest average pass rate of 95.6%, followed by government-aided schools with 94.2%, and public schools with 93.6%. Overall, the average pass rate in Geography improved across all the school ownership categories between 2019 and 2022. However, private schools consistently outperformed government-aided and public schools in all three years.

3.2.21 Pass Rate in S.3 History National Examination

Like in other O-level subjects, analysis of S.3 History national examinations results focused on the general pass rate, pass rate by gender, by location (province, district and rural-urban divide) as well as by school ownership. The figure below indicates general pass rate in S.3 History national exam for 2019, 2021 and 2022.

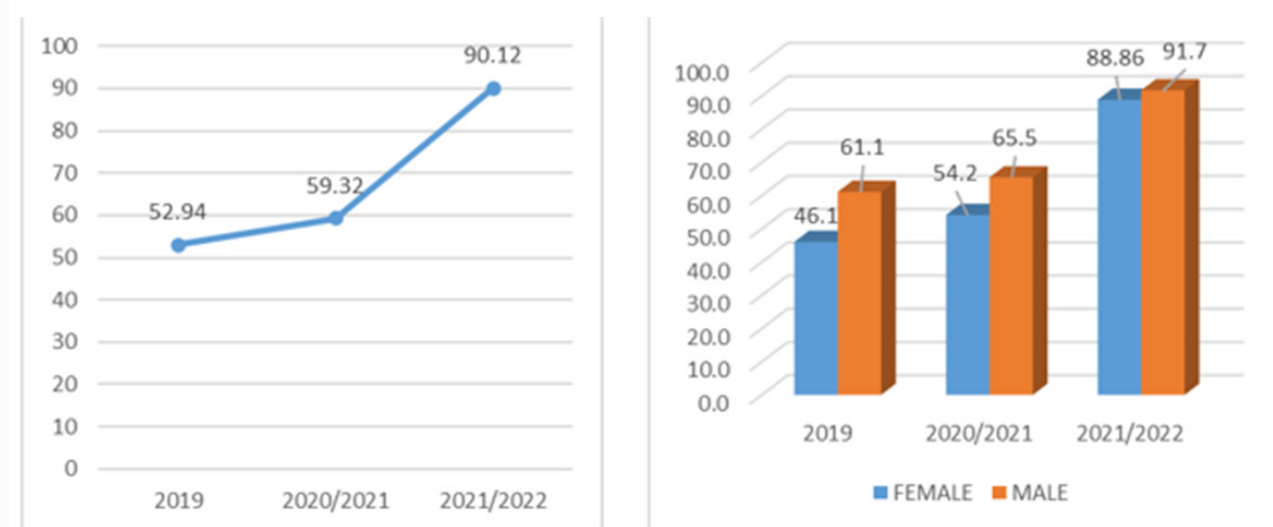


Figure 63: General pass rate and pass rate by gender

According to the above figure, the general pass rate in 2019 (52.94%) and 2021 (59.32%) was low, but in 2022, it significantly increased to 90.12%. Gender wise, the pass rate of male and relatively higher than that of female across the three years, but the pass rate gradually improved for both male and female. This is an indicator that efforts made to improve students' performance over the years yield results for either gender. Continued efforts to eliminate gender bias and provide equal access to resources and support could help to further narrow performance gaps between male and female students.

3.2.22 Mean, SD and CV of scores in S.3 History

The table below presents the Mean, SD and VC of scores in S.3 History national examination.

Table 14: Mean, SD and CV of scores in S.3 Geography

	2019	2021	2022
Mean	27.89	34.47	33.91
SD	22.69	24.75	22.35
VC	81.34	71.78	65.93
N	114,423	121201	127730

As seen in the above table, the mean score in 2019 was low (27.89), but in 2021 and 2022, it increased to 34.47 and 33.91. This means that there was an improvement in the teaching and learning strategies hence improvement in performance. However, as indicated by the SD and CV, the scores were relatively spread out of the mean, which implies that there were variations, with some students scoring highly and other poorly.

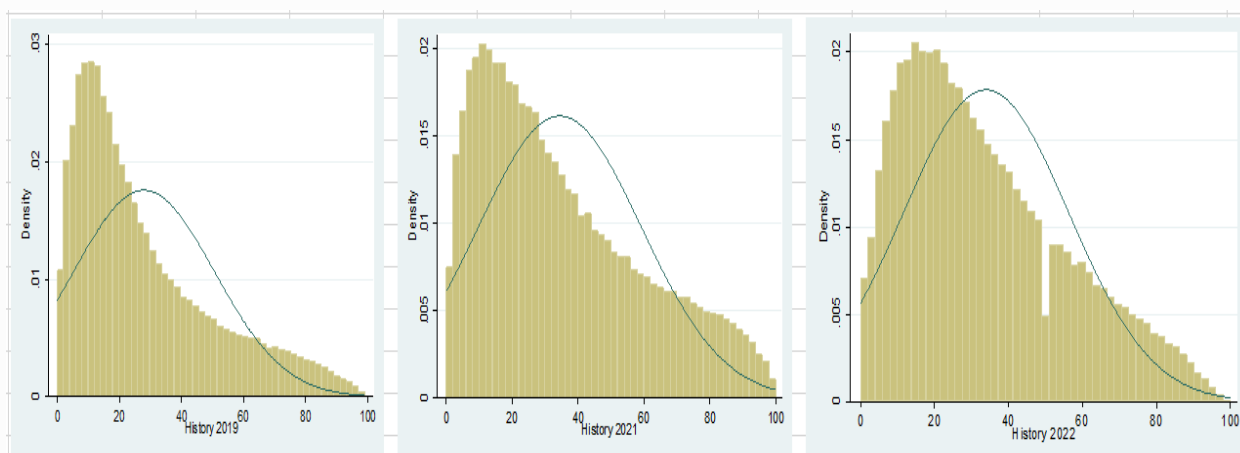


Figure 64: Distribution of Scores in S3 History Subject on normal curve

The above figure shows the distribution of scores for History subject on a normal distribution curve. In 2019, the distribution normal curve is non-symmetrical and majority of the scores clustered on the left side of the curve with relatively few on the right. This suggests that most scores are below the mean. However, in 2021 and 2022 the distribution of scores tends towards the mean, but with some on extreme sides of the curve.

3.2.24 Pass rate in S.3 History national exam by location

The analysis of pass rate in S.3 History national exam by location focused on province, rural –urban divide and by district. The figure below shows pass rate by province.

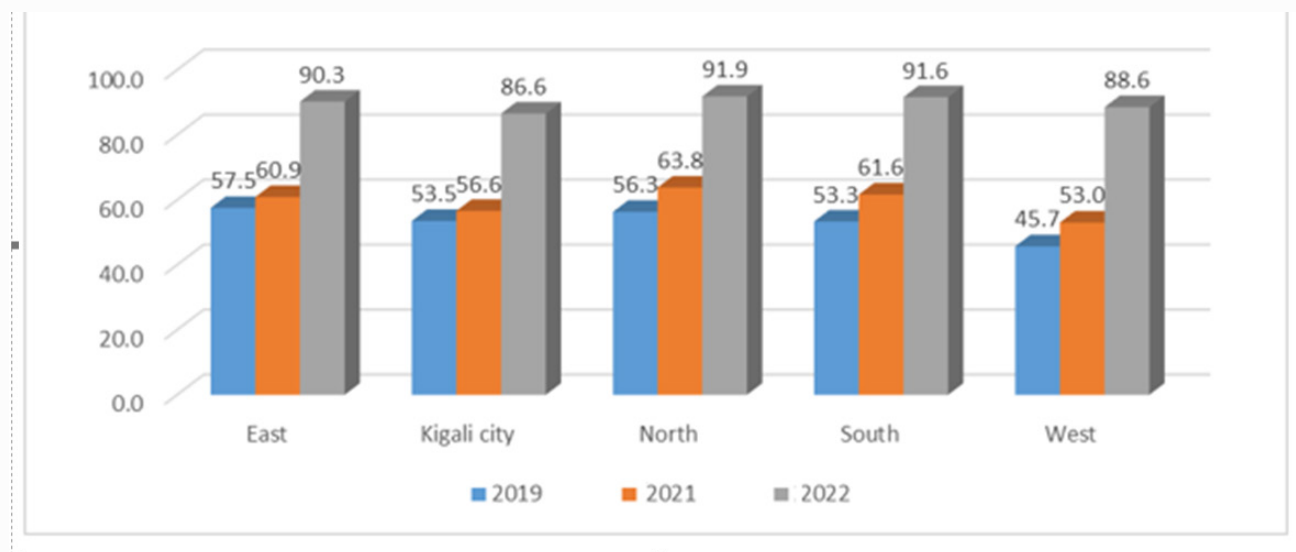


Figure 65: Pass rate in S.3 History by Province

Figure 65 shows the performance of S3 students in history subject in different provinces of Rwanda for three consecutive years: 2019, 2021, and 2022. In 2019, the average pass rate for all provinces and Kigali city was 52.9%, with the lowest pass rate observed in the West (45.7%) and the highest in the East (57.5%). In 2021, the average pass rate slightly improved to 59.3% for all provinces including Kigali city, with the lowest pass rate in the Western Province (53.0%) and the highest in the Northern Province (63.8%). Furthermore, in 2022, the average pass rate improved further to 90.1% for all the provinces, with the lowest pass rate being in Kigali city (86.6%) and the highest in the Eastern province (90.3%).

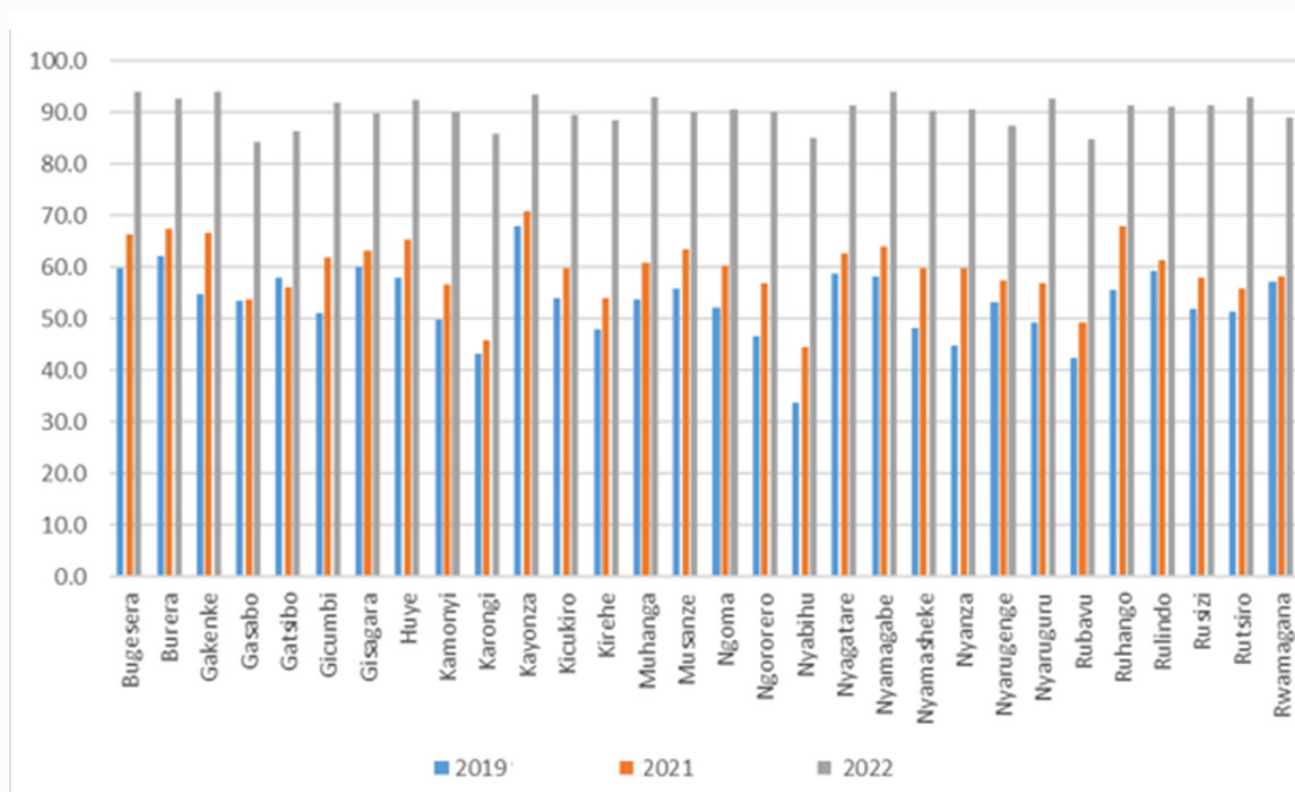


Figure 66: Performance in History Subject by District

The data provided in Figure 64 shows the percentage of students who passed the History subject exam in each district of Rwanda for the years 2019, 2021, and 2022. Overall, the data suggests that the pass rate in History subject improved across most of the districts in 2021 and 2022. The average percentage of students who passed the subject increased from 52.9% in 2019 to 59.3% in 2021, and further to 90.1% in 2022. In terms of individual district performance, Nyabihu district had the lowest percentage of students who passed History subject exam in 2019 with only 33.7%. However, this district showed a significant improvement in the years that followed, with 44.4% of students passing in 2021, and 85% in 2022. On the other hand, the district of Bugesera had the highest percentage of students who passed History subject exam in 2019 with 59.8%. This district also showed improvement in subsequent years, with 66.4% of students passing in 2021, and a remarkable 93.9% of students passing in 2022. The district of Karongi had the lowest percentage of students passing History subject in both 2021 and 2022 with 45.9% and 85.9% respectively. On the other hand, Nyamagabe district had the highest percentage of students who passed History subject exam in 2022 with 94.1%. Overall, the data suggests that the majority of the districts in Rwanda improved on the students' performance in that subject over the years. However, there are still some districts that need more attention to improve their performance in this subject.

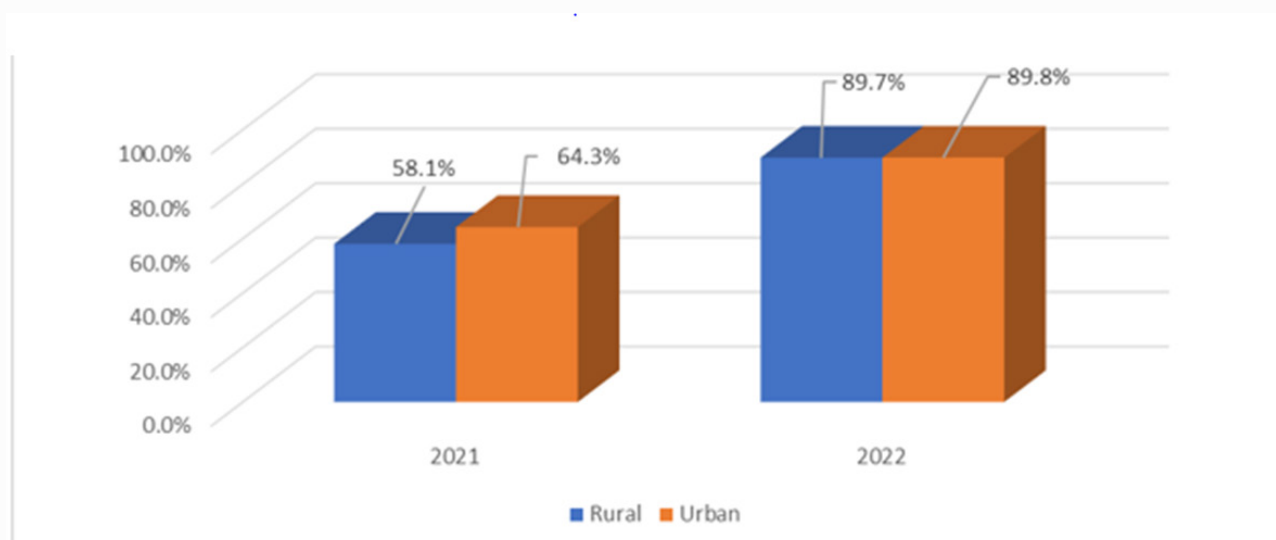


Figure 67: Pass rate in History in Rural and Urban schools

Based on the data in Figure 67, it can be observed that there has been a significant increase in the pass rate in History in both rural and urban school from 2021 to 2022. In rural schools, the pass rate increased from 58.1% in 2021 to 89.7% in 2022, which is a substantial increase of 31.6%. Similarly, in urban schools, the pass rate increased from 64.3% in 2021 to 89.8% in 2022. The data suggests that there was an overall improvement in the pass rate in both rural and urban schools. However, the percentage increase in pass rate was slightly higher in rural schools compared to urban schools and in urban schools the pass rate was relatively higher than in rural schools across the two years.

3.2.25 Pass Rate in History by School ownership

The figure below shows the pass rate in S.3 History exam by type of school ownership, that is, public, private and government aided.

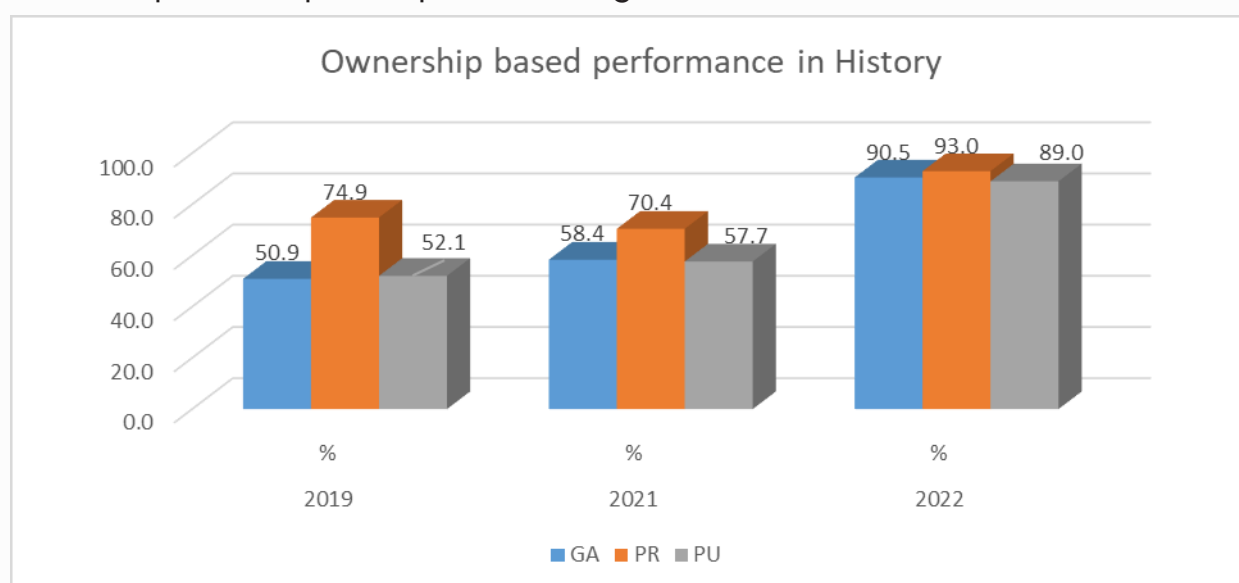


Figure 68: Pass rate in History by School Ownership

From the data provided in Figure 68, it is clear that private schools consistently outperformed government-aided and public schools in the History subject over the three years (2019, 2021, 2022). In 2019, private schools recorded the highest pass rate of 74.9%, followed by government-aided schools at 50.9%, and public schools at 52.1%. In the same way, in 2021, private schools still recorded the highest pass rate of 70.4%, followed by government-aided schools at 58.4%, and public schools at 57.7%. The trend of pass rate in S.3 History exam. Overall, private schools had the highest average pass rate of 79.4%, followed by government-aided schools with 66.6%, and public schools at 66.3%. This indicates that private schools generally performed better in the History subject compared to government-aided and public schools.

3.2.26 Pass Rate in S.3 Entrepreneurship National Examination

The analysis of pass rate in S.3 Entrepreneurship national exam by location focused on province, rural -urban divide and by district. The figure below shows pass rate by province.

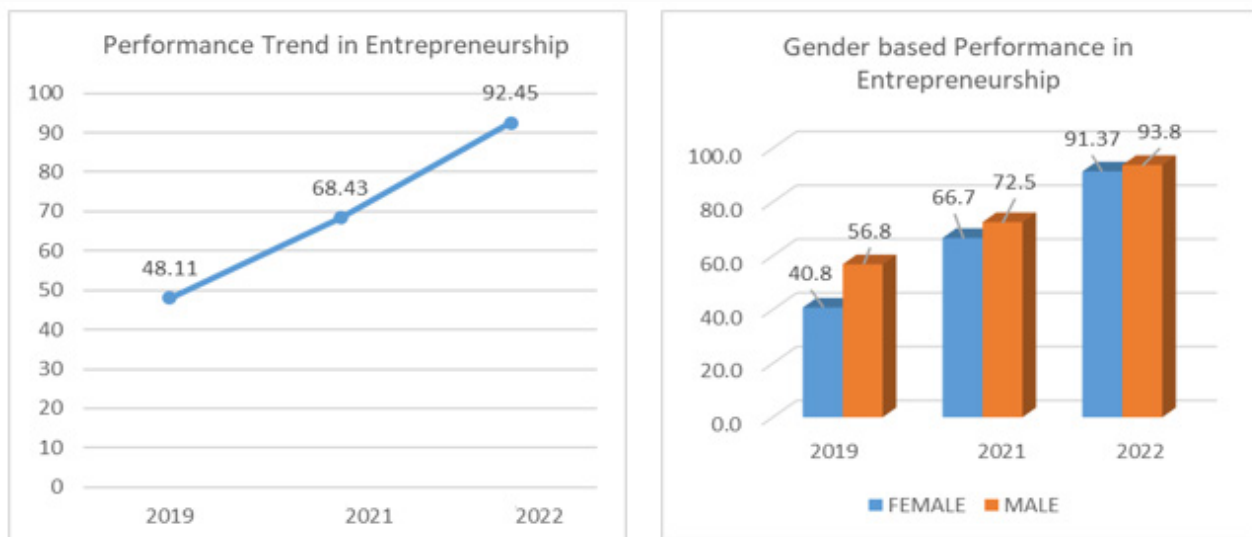


Figure 69: General pass rate in Entrepreneurship and pass rate by gender

In shown in Figure 69, the pass rate in S3 Entrepreneurship national exam progressively increased over the three years. It increased from 48.11% in 2019 to 68.43% in 2021 and to 92.45% in 2022. This trend of increment in the pass rate means that students' performance in the Entrepreneurship subject has been steadily improving over the years. The trend of increment in pass rate was similar in terms of gender, but male students consistently outperformed female. This trend suggests that efforts to promote gender equality in education are starting to yield results. However, there is still a need to address the gap in performance between male and female students in Entrepreneurship subject.

3.2.27 Mean, SD and CV of scores in Entrepreneurship

The table below presents the Mean, SD and VC of scores in S.3 Entrepreneurship national examination.

Table 15: Mean, SD and CV of Entrepreneurship

	2019	2021	2022
Mean	24.36	39.18	38.04
SD	19.56	23.59	21.77
VC	80.30	60.21	57.24
N	114,423	121201	127186

Table 15 shows the average score, standard deviation, variation coefficient, and the number of students for the Entrepreneurship subject in three different years: 2019, 2021, and 2022.

The mean score for the Entrepreneurship subject significantly improved over the years. In 2019, the mean score was 24.36, while in 2021, it increased to 39.18, and in 2022, it further increased to 38.04. This indicates that students performed better in Entrepreneurship over the years. In 2019, the SD was 19.56, and it increased to 23.59 in 2021, but decreased to 21.77 in 2022. This implies that the dispersion of scores from the mean was higher in 2021 than in 2019 and 2022. In 2019, the VC was 80.30%, and it reduced to 60.21% in 2021 and further dropped to 57.24% in 2022. This implies that the variability of scores reduced over the years, and the performance of students became more consistent.

Overall, the analysis suggests that there was a significant improvement in the performance of students in Entrepreneurship subject over the years, with an increase in mean scores, a decrease in the relative variability of scores, and a reduction in the dispersion of scores from the mean. Efforts to sustain and improve the performance in the Entrepreneurship subject should be explored such that they help students to acquire relevant skills for entrepreneurship and prepare them for future careers.

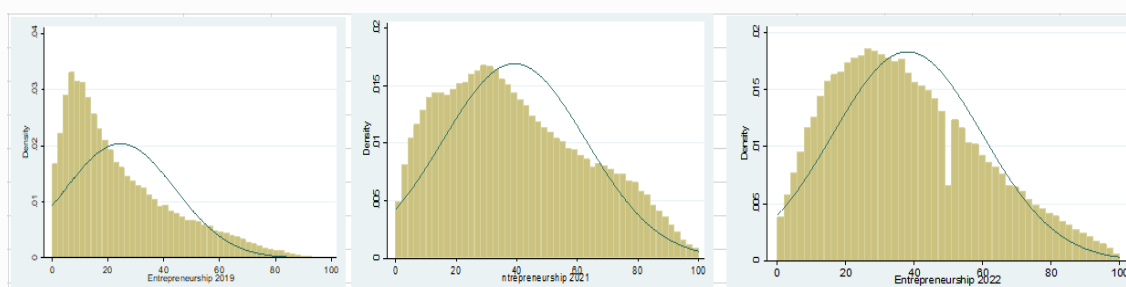


Figure 70: Distribution of Scores in S3 Entrepreneurship exam

Generally, the curves in Figure 70 are non-symmetrical indicating that the scores are not evenly distributed on the normal curve, which means that there were variations in student performance whereby more scores were below the mean and a few spread above the mean especially in 2019. However, in 2021 and 2022 the performance improved and the scores are fairly skewed on both sides of the normal distribution curves.

3.2. 28 Pass rate in Entrepreneurship by location

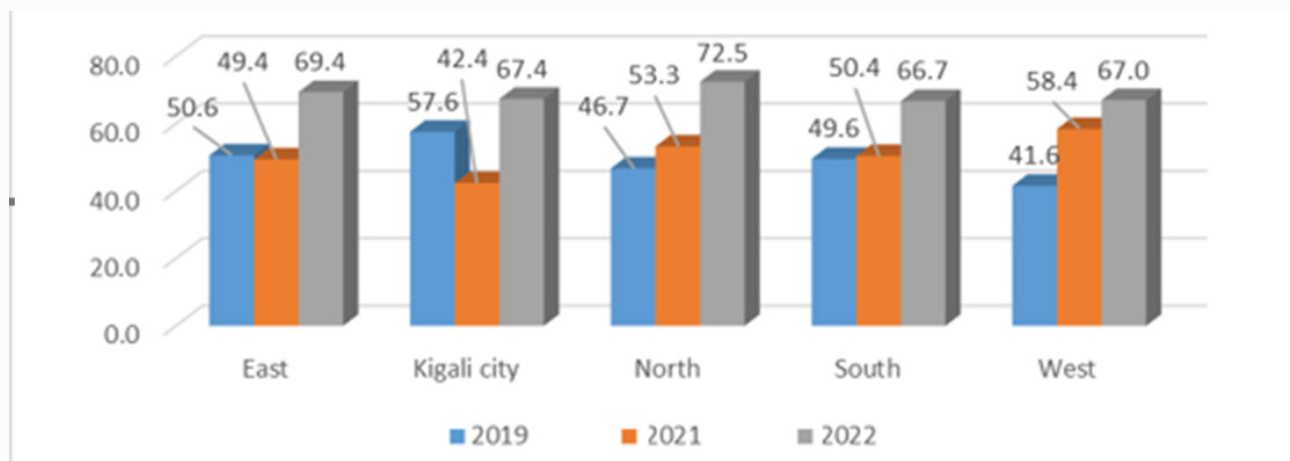
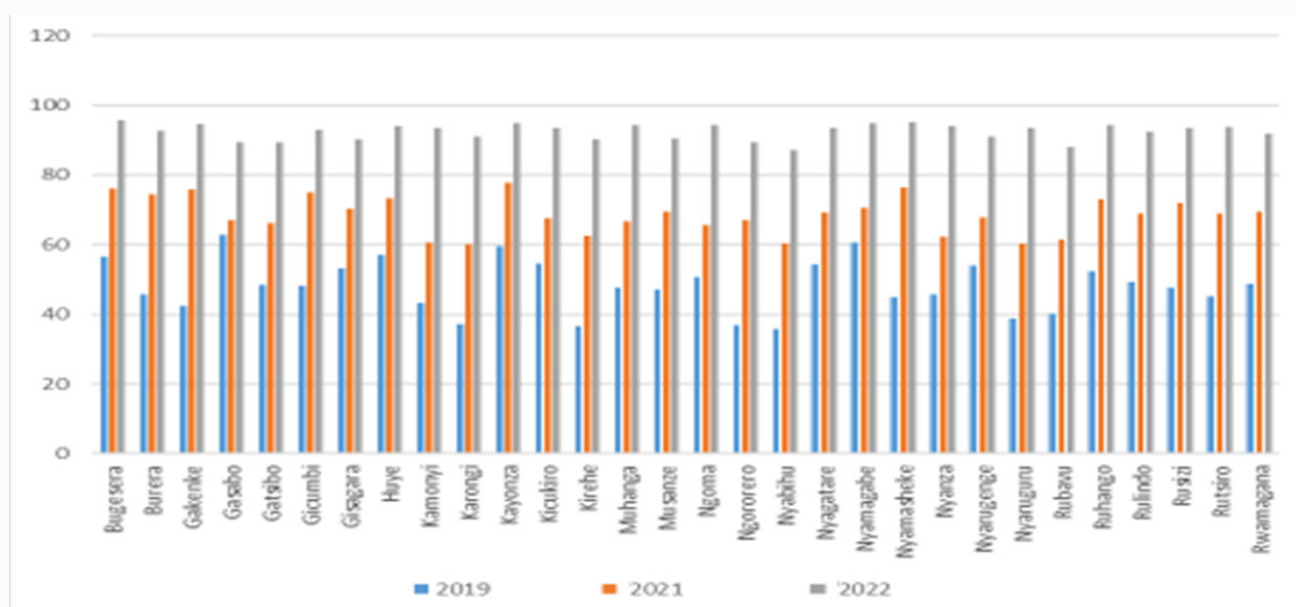


Figure 71: Performance of Entrepreneurship by Province

From Figure 71, it can be observed that the overall entrepreneurship performance in Rwanda improved over the years, with an increase from 48.1% in 2019 to 68.4% in 2021, and further to 92.4% in 2022.

In 2019, the Eastern province had the highest pass rate (50.6%) while the Western had the lowest pass rate (41.6%). However, in 2021, the Northern Province had the highest pass rate (72.5%), but the Western province still had the lowest pass rate 58.4%.

In 2022, all provinces showed remarkable improvement in entrepreneurship with the Northern and Southern provinces having the highest pass rates of 92.5% and 93.7%, respectively. Kigali City also showed a remarkable improvement with 91.0%, but the Western province remained having the lowest pass rate of 67.0%. Overall, all the provinces have shown significant improvements in entrepreneurship performance over the years. However, there are still differences in performance across provinces, with the Northern and Southern provinces consistently showing higher performance than the other provinces. This data can be used by policymakers to identify areas that require further support to improve entrepreneurship performance in Rwanda.



Deduced from Figure 70, there has been a consistent improvement pass arate in S.3 Entrepreneurship national exam in all the districts of Rwanda over the three years. The average pass rate for all districts increased from 48% in 2019 to 68.4% in 2020/2021 and 92.4% in 2022. The top-performing districts in 2022 were Bugesera (95.7%), Nyamasheke (95.3%), Nyamagabe (95.0%), and Kayonza (95.0%) while the lowest-performing districts in 2022 were Nyabihu (87.2%), Rubavu (87.9%), and Ngororero (89.3%).

Some districts showed consistent improvement over the three years, such as Bugesera, which increased its performance from 56% in 2019 to 95.7% in 2022, and Nyamagabe, which increased its performance from 61% in 2019 to 95% in 2022. Other districts showed inconsistent performance, such as Kicukiro, which increased its performance from 55% in 2019 to 93.4% in 2021 but decreased to 67.5% in 2022. Gasabo is an interesting case as its performance decreased from 63% in 2019 to 67% in 2021 but increased significantly to 89.4% in 2022.

In summary, there has been an overall improvement in district performance in the S3 Entrepreneurship subject over the past three years. However, there are still some districts that need to improve their performance, and some districts have shown inconsistent performance over the years. Further investigation is needed to understand the factors that contributed to the improvement or decline in performance in each district.

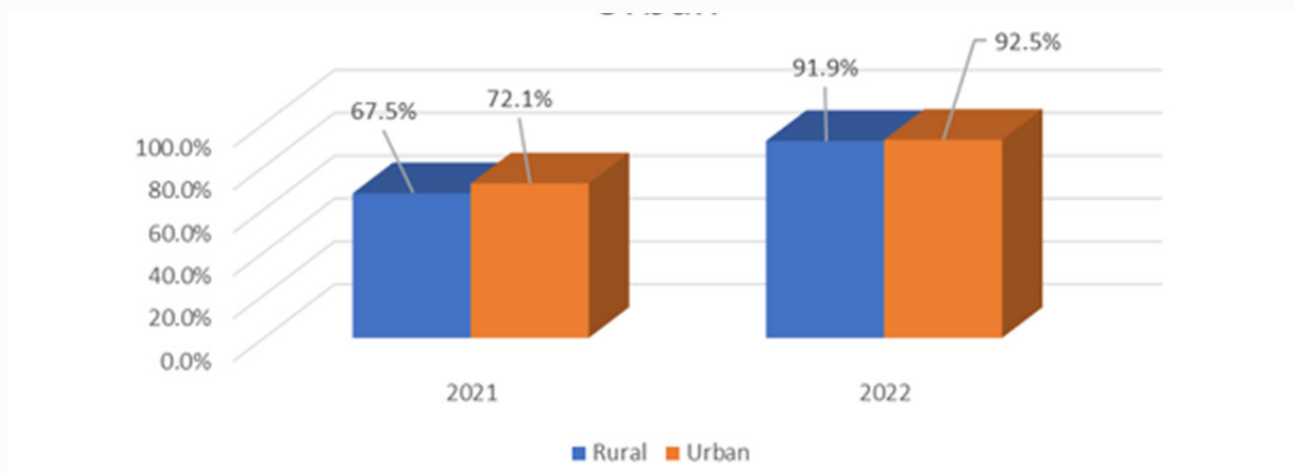


Figure 73: Pass rate in Entrepreneurship between Rural and Urban schools

The data provided in Figure 73 show the percentage of students who passed Entrepreneurship subject for two school years (2021 and 2022) in rural and urban schools. It is evident that there has been a significant increase in the performance of Entrepreneurship subject in both rural and urban areas from 2021 to 2022. In rural areas, the percentage of students who passed Entrepreneurship increased from 67.5% to 91.9%. Similarly, in urban schools, the percentage of students who passed increased from 72.1% to 92.5% in 2022. The data suggests that there has been an overall improvement in the pass rate of the Entrepreneurship subject in both rural and urban schools. However, the percentage increase was slightly higher in rural schools compared to urban.

3.2.29 Pass Rate in Entrepreneurship by School Ownership

The figure below presents the pass rate of students in Entrepreneurship by type of school ownership.

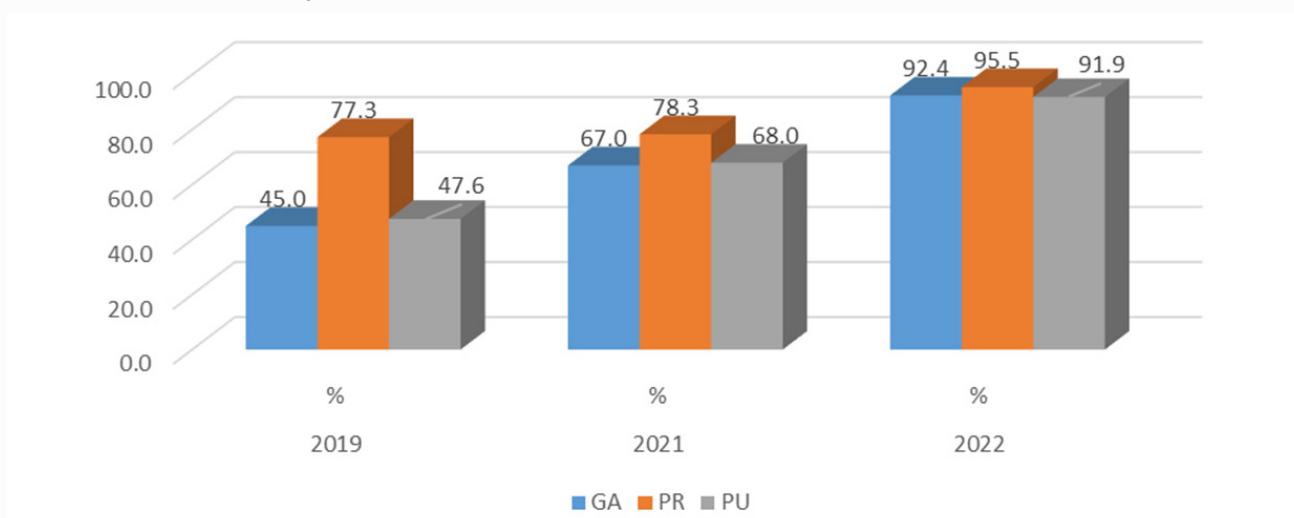


Figure 74: Pass rate in Entrepreneurship by school ownership

As indicated in the above figure, private schools have consistently performed better than government-aided and public schools. Private schools recorded the highest pass rate with 77.3%, 78.3%, and 95.5% in 2019, 2021, and 2022 respectively.

Government-aided schools recorded the lowest pass rate with 45.0%, 67.0%, and 92.4% in 2019, 2021, and 2022 respectively.

3.2.30 Pass Rate in S.3 English National Examination

Senior three English National Examination results were analysed in general and by gender. Also, analysis was done according to school location (province, district, and rural urban) and type of school ownership. The figure below indicates the results of the analysis in general and by gender.

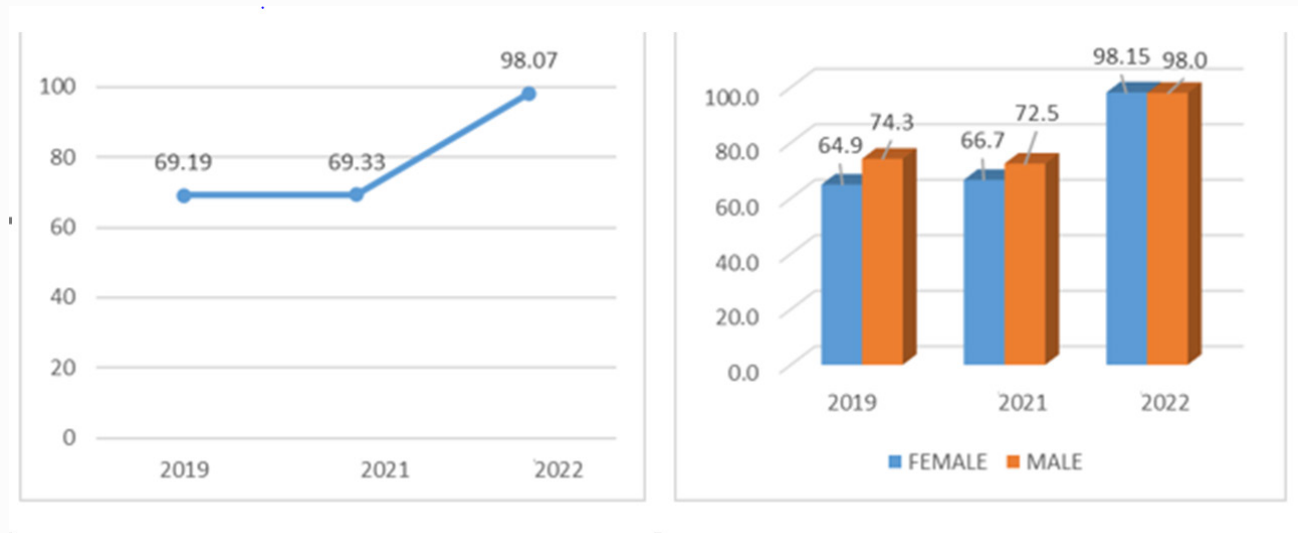


Figure 75: General pass rate in S.3 English exam and pass rate by gender

Looking at the trend of the general pass rate in S3 English national exam, it can be observed that there was no significant change between 2019 and 2021. However, in 2022 it greatly increased from 69.33% in 2021 to 98.07%. Overall, the S3 English pass rate trend shows that students' English proficiency is improving. Concerning gender, in 2019, the pass rate of female was 64.9% and that of male stood at 74.3%. This indicates that male students outperformed female students in English. In 2021, the pass rates for both male and female students increased, with 66.7% of females and 72.5% of males. However, the gender gap in the pass rate persisted, with male students still outperforming female students. In 2022, there was a significant improvement in the pass rate of both male and female students. The pass rates for both female and male were very high, with 98.15% of female students and 98% of male students. It is also worth noting that the gender gap in pass rate in English narrowed considerably in 2022, with both male and female students achieving similar pass rates.

3.2.31 Mean, SD and CV of scores in English exam

The table below presents the Mean, SD and VC of scores in S.3 English national examination.

Table 16: Mean, SD and CV of scores in English exam

	2019	2021	2022
Mean	26.63	38.60	47.25
SD	13.72	16.74	18.19
VC	51.54	43.36	38.50
N	114,423	121201	127178

The mean score for the English subject has increased consistently from 26.63 in 2019 to 38.60 in 2021, and to 47.25 in 2022. This indicates an overall improvement in the students' performance in English subject. However, there were high variations in scores from the mean as indicated by the high SD and VC. According to the American Psychological Association (APA) (2019) guidelines for reporting statistical results, a standard deviation that is less than one-third of the mean can be considered a small variation, while a standard deviation that is greater than or equal to one-third of the mean can be considered a large variation.

Overall, the data suggests an improvement in the students' performance in the English subject over the years, with an increase in the mean score and a decrease in the variation coefficient. However, the increase in the standard deviation suggests that there was also a wider range of performance among students in the later years.

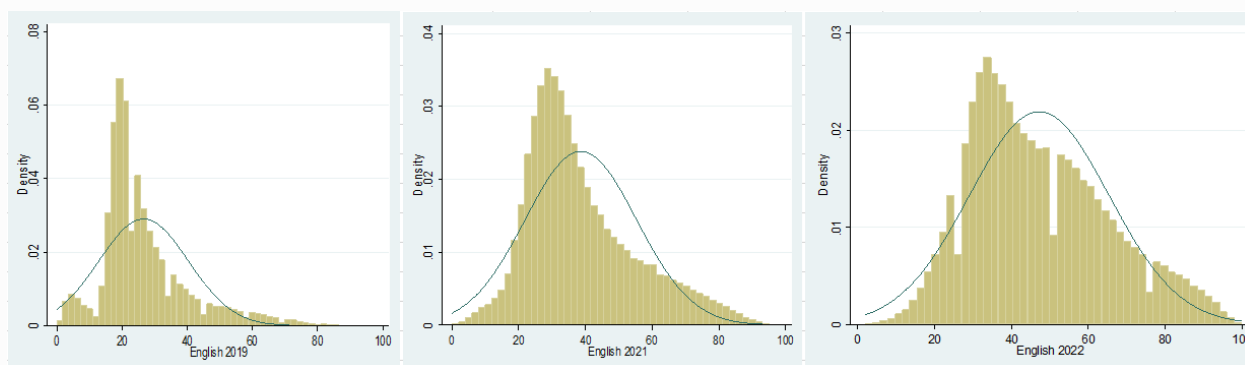


Figure 76: Distribution of Scores in S3 English Subject

The curves in the figure above are symmetrical which means that the scores are fairly distributed around the mean with some spread to the extremes. This indicates an overall improvement in the students' performance in the subject, with more students scoring at a higher level than in subjects.

Overall, the data suggests that there has been a consistent improvement in the students' performance in the English subject over the three years, with more students scoring at higher levels each year. The normal distribution curves also indicate that the distribution of scores is approximately symmetrical and bell-shaped, with the majority of scores concentrated around the mean, suggesting a relatively consistent level of performance across the student population.

3.2.32 Pass rate in S.3 English national exam by location

The figure below shows students' pass rate in English national exams according to province including Kigali city.

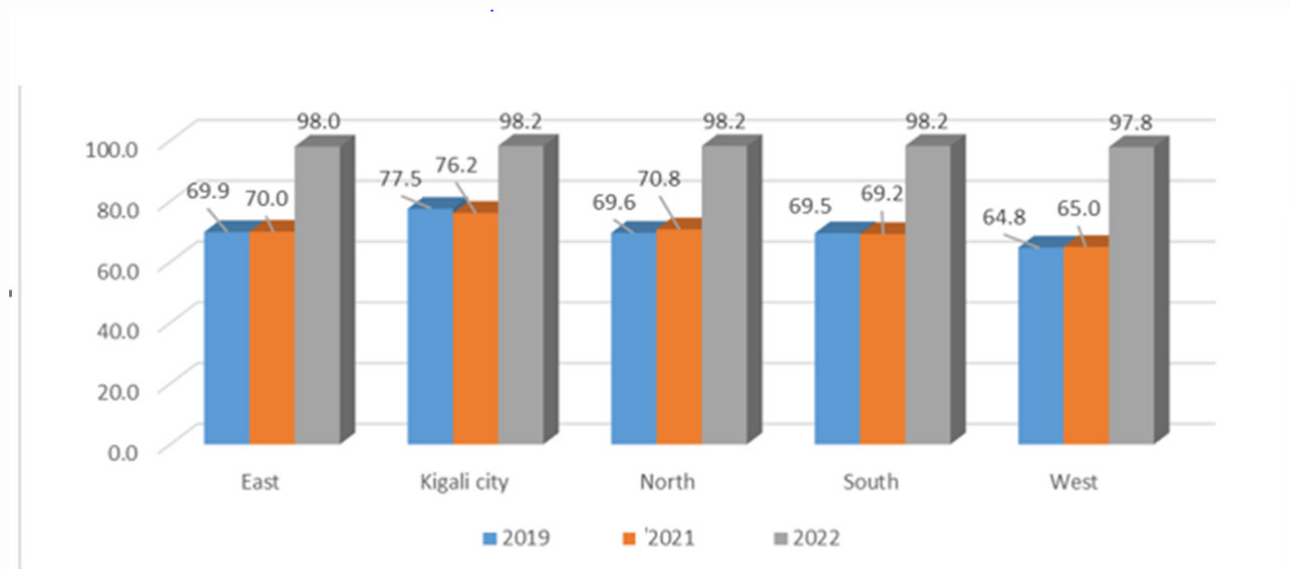


Figure 77: Pass rate in English by Province

Based on the data in Figure 77, it can be concluded that the overall pass rate in English exam remained relatively stable over the years, with a slight increase from 69.2% in 2019 to 69.3% in 2021, and a further increase to 98.1% in 2022. Comparison the pass rate in different provinces show that in 2019, Kigali City had the highest pass rate (77.5%) while the Western had the lowest (64.8%). However, in 2021 and 2022, all provinces more or less the same pass rate, ranging from 69.2% to 70.8% in 2021, and from 97.8% to 98.2% in 2022.

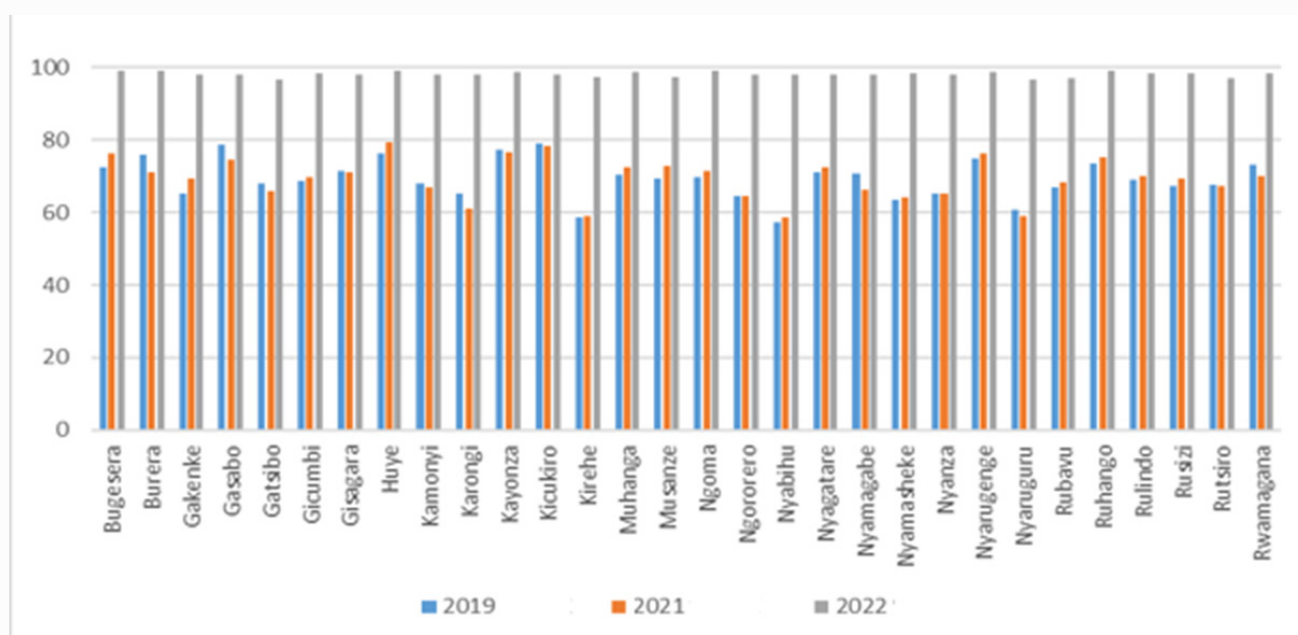


Figure 78: Pass rate in English by district

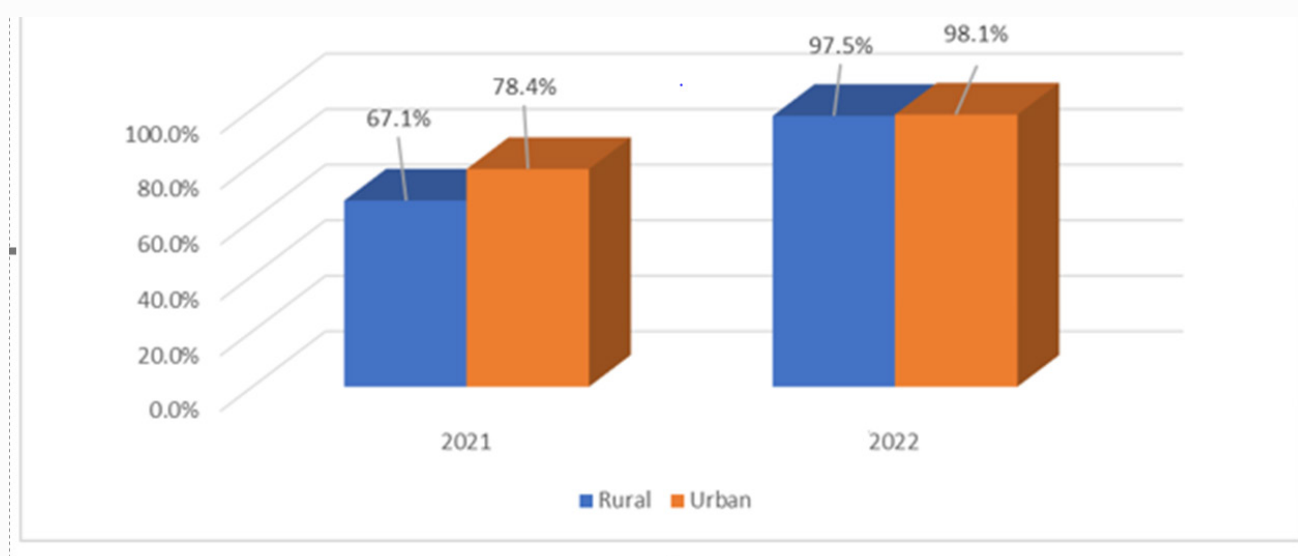


Figure 79: Pass rate in English in Rural and Urban schools

According to the above figure, it is evident that there has been a significant increase in the performance of English subject in rural and urban schools in 2021 and 2022. Generally, the pass rate in 2021 was relatively lower than in 2022. The pass rate in urban schools was observed to be higher than rural in 2021, but in 2022, the pass rate in both rural and urban schools was almost the same, that is, 97.5%, and 98.1% respectively. The data suggests that there has been an overall improvement in the performance of the English in both rural and urban schools.

3.2.33 Pass rate in S.3 English by school ownership

The figure below presents findings from analysis of English national exam results by school ownership.

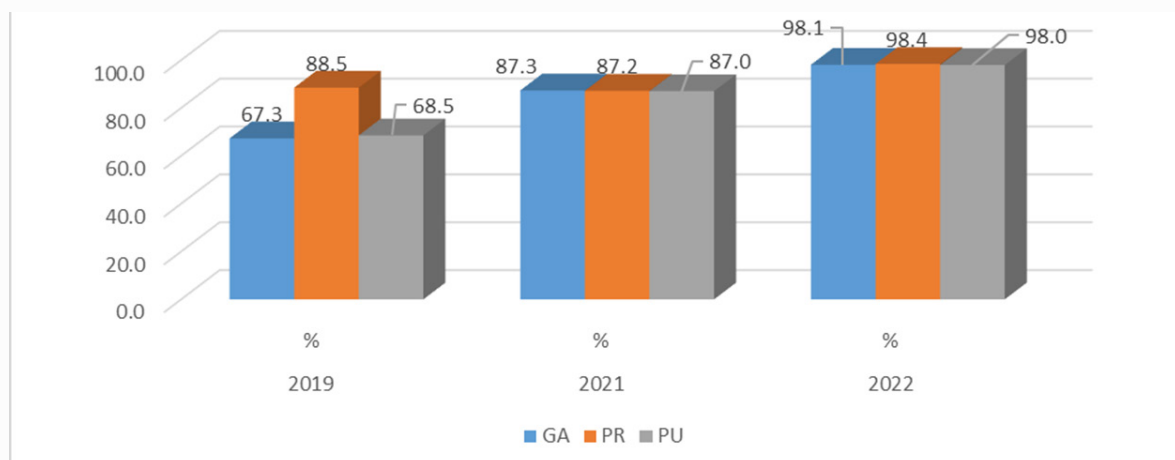


Figure 80: Pass rate in English according to school ownership

Figure 80 shows the pass rate in S3 English for three consecutive years (2019, 2021, and 2022), categorized by the ownership of the school. In 2019, the highest percentage of students who passed S3 English was in the private schools (88.5%). This was followed by public schools (68.5%) and lastly Government-aided schools (67.3%). In 2021, all the three categories of school ownership were at the same footing in terms of the percentage of students who passed English national exam. Similarly in 2022, again all the three categories had the same proportion of students who passed. This indicates a significant improvement in the performance of schools in S3 English. All school categories had high percentages of students who passed, with the Private school's category still having the highest percentage of 98.4%, followed closely by Government-aided schools with 98.1%. Public schools also had a high percentage of students who passed, with a percentage of 98.0%. Overall, the data suggests that there is a correlation between the school ownership and the performance of students in S3 English, with Private schools consistently performing better than Government-aided and public schools. However, all school categories have shown significant improvements in the past year, resulting in high percentages of students who passed S3 English in 2022. Further analysis is needed to understand the factors that contribute to the performance differences among different school ownership types in English.

3.2.34 General pass rate in Kinyarwanda

The figure below shows students general pass rate in Kinyarwanda and pass rate by gender for 2019, 2021 and 2022.

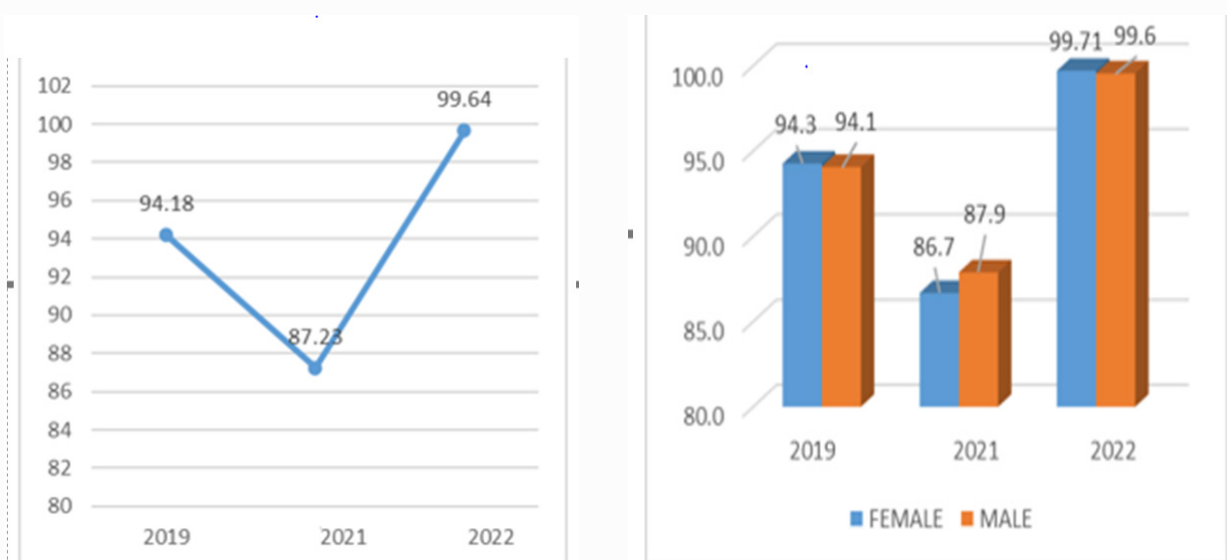


Figure 81: Pass rate trend in Kinyarwanda and pass rate by gender

Figure 81 shows that the general pass rate in 2019 was high, but it slightly dropped in 2021. This suggests that there was a decline in the students' performance but in 2022, the pass rate improved significantly and almost all students passed (99.64%). In terms of gender, there was no big difference in the pass rate between female and male students.

Overall, the data suggests that both male and female students are making progress in their learning of the Kinyarwanda subject, with the majority of them performing well in the subject. It is important to continue monitoring the performance of male and female students in the subject to ensure that both groups are performing at their best and achieving their full potential.

3.2.35 Average score and distribution of scores in Kinyarwanda

The table below presents the mean scores, standard deviation and variation coefficients of scores in Kinyarwanda exam results for ordinary level.

Table 17: Mean, SD and VC of scores in Kinyarwanda

	2019	2021	2022
Mean	49.47	49.76	56.74
SD	12.88	13.53	12.91
VC	26.03	27.20	22.76
N	114,423	121,201	127,172

Table 17 shows the performance in 2019 and 2021 was consistent as evidenced by the mean scores. The performance improved in 2022 as the mean increased from about 50 in 2019 and 2021 to about 57 in 2022. Looking at the standard deviations and variation coefficients the scores were clustered around the mean and there were no high variations away from the mean.

Overall, the data in Table 17 suggests that there has been an improvement in the performance of students in the Kinyarwanda subject over the three years, with an increase in the average score and a decrease in the variation coefficient. However, the standard deviation has remained relatively stable over the three years, indicating that there has been no significant change in the spread of scores around the mean. It is important to continue monitoring the performance of students in the Kinyarwanda subject to ensure that students are achieving their full potential and to identify any areas where further improvements can be made.

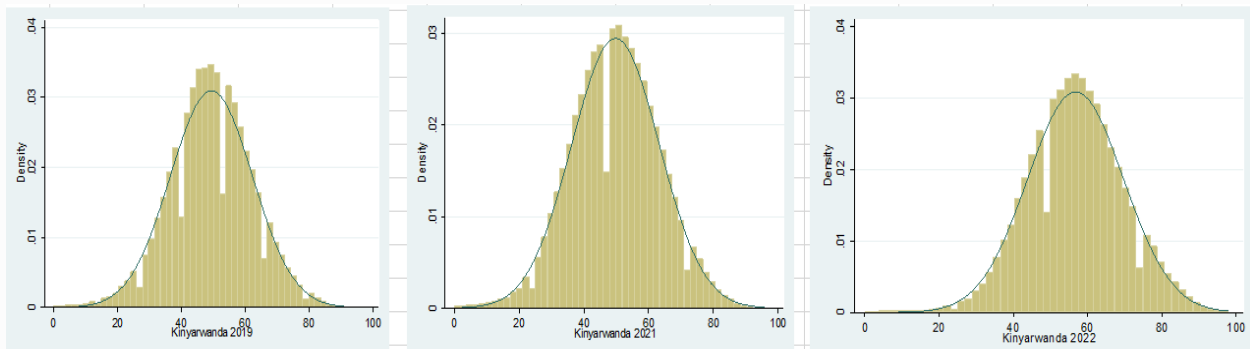


Figure 82: Distribution of Scores in S3 Kinyarwanda Subject

Figure 82 shows the distribution of scores for the Kinyarwanda subject in the three years (2019, 2021, and 2022) was symmetrical, with majority of the scores equitably concentrated around the mean. However, there were some few scores at the extreme ends of the normal distribution curves, that is, very low scores and very high scores. The distribution curve for each year appears to be relatively symmetrical, with similar numbers of students scoring above and below the mean score. This suggests that the performance of students in the Kinyarwanda subject was relatively balanced, with a similar proportion of students achieving high and low scores.

3.2.36 Pass rate in Kinyarwanda by province

The figure below shows students pass rate in Kinyarwanda disaggregated by province including Kigali city.

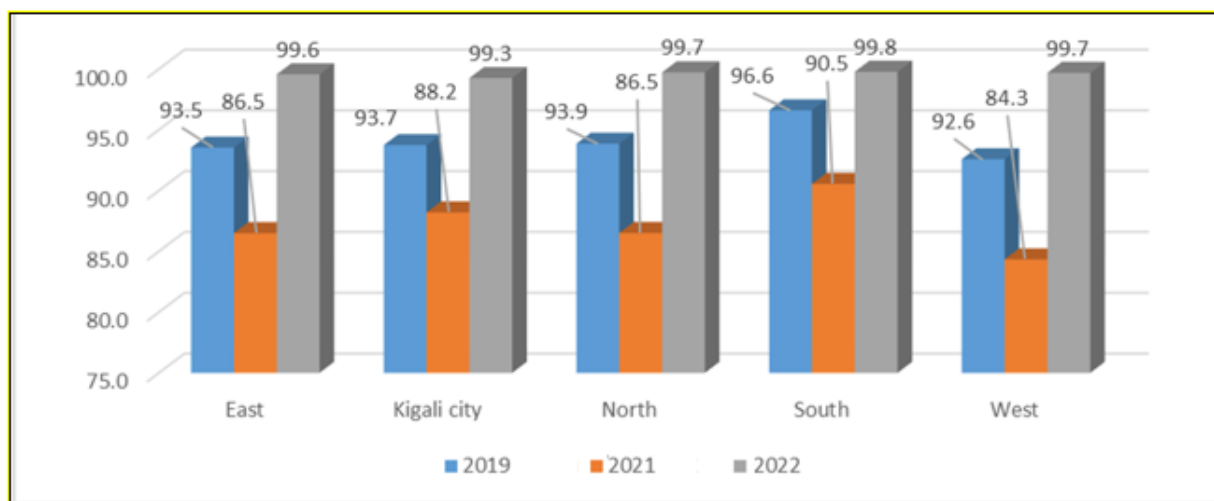


Figure 83: Pass rate in Kinyarwanda by Province

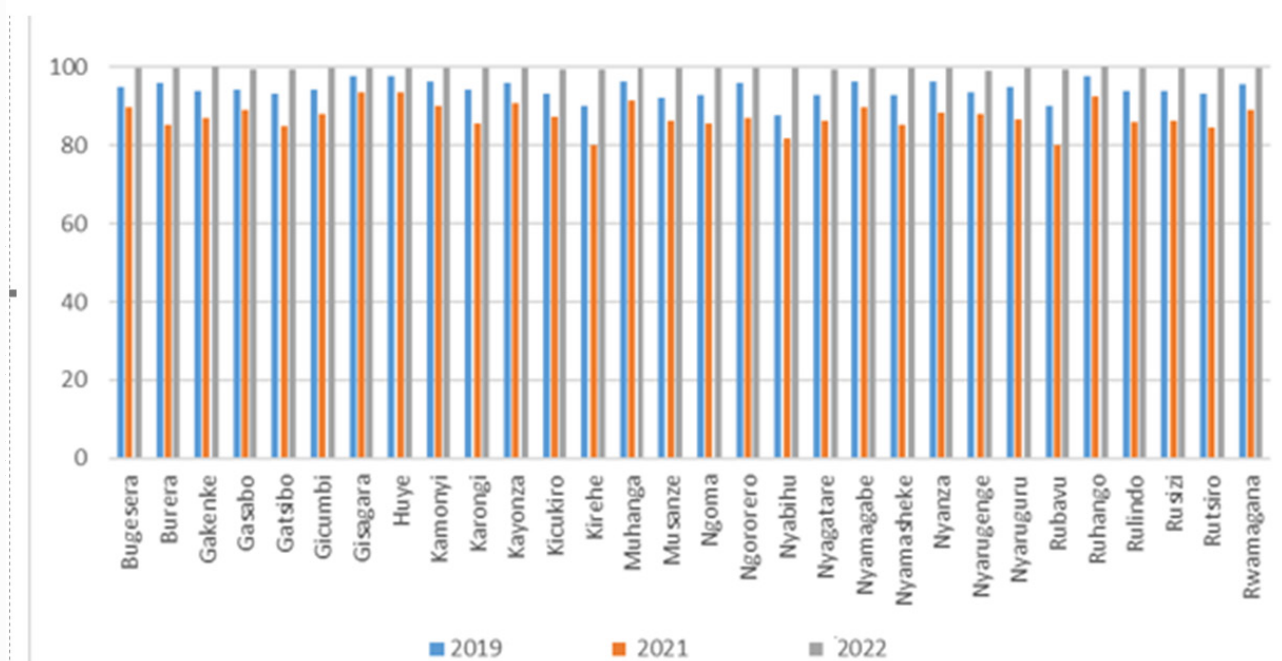


Figure 84: Pass rate in Kinyarwanda by District

As indicated in the above figure, the district with the highest pass rate in Kinyarwanda subject in 2022 was Gisagara with 99.9%, followed by Ruhango with 99.9% and Gicumbi with 99.8%. In 2021, Gisagara had the highest performance with 93.4%, followed by Huye with 93.5% and Muhanga with 91.4%. However, in 2019, the district with the highest performance was Huye with 98%, followed by Ruhango with 98% and Gisagara with 98%.

The district with the lowest performance in Kinyarwanda subject in 2022 is Karongi with 99.9%, followed by Kirehe with 99.5% and Rubavu with 99.5%. In 2021, Rubavu had the lowest performance with 80%, followed by Kirehe with 80% and Nyabihu with 81.9%. However, in 2019, the district with the lowest performance

was Kirehe with 90%, followed by Rubavu with 90% and Nyabihu with 88%. Overall, most districts have shown an improvement in Kinyarwanda subject performance from 2021 to 2022. However, there are still some districts that need to improve their performance in this subject.

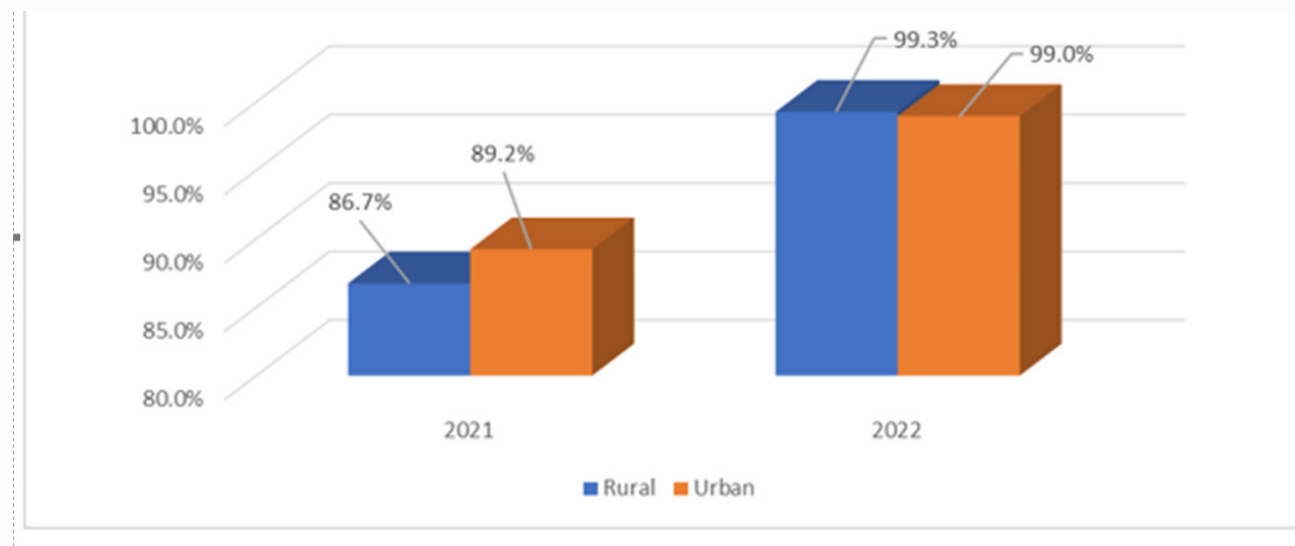


Figure 85: Pass rate in Kinyarwanda in Rural and Urban schools

According to the above figure, there was a noticeable improvement in the pass rate in both rural and urban schools in 2021 and 2022. In 2019, the pass rate in urban schools was relatively higher than rural, but in 2022, the pass rates were the same in rural and urban areas.

3.2.37 Pass rate in Kinyarwanda by school ownership

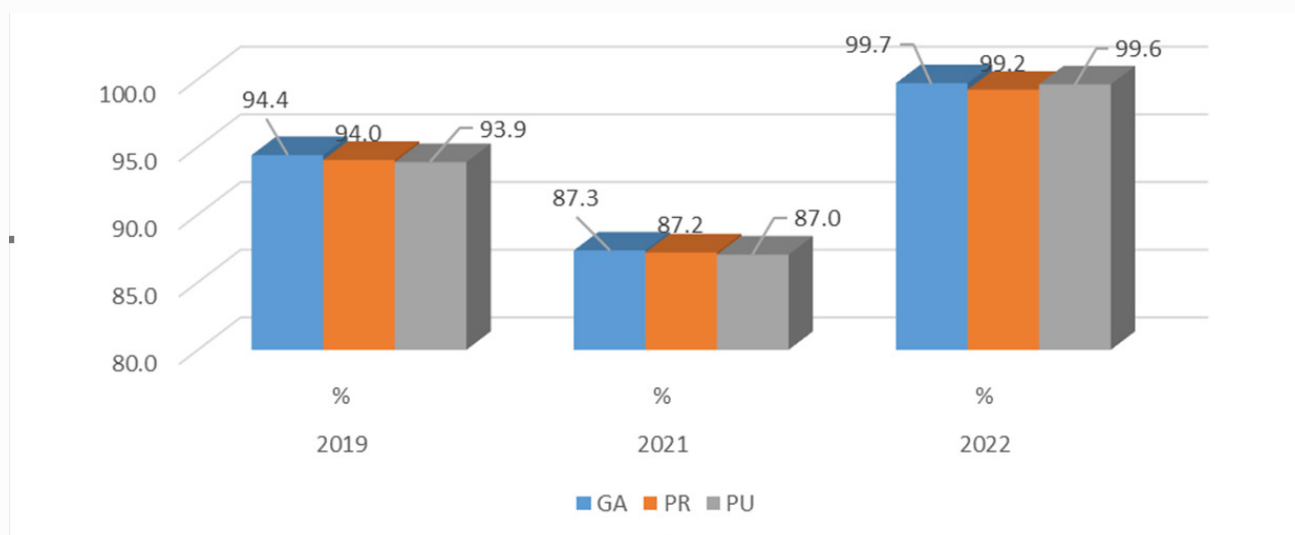


Figure 86: Ownership based Performance in Kinyarwanda

The figure 86 shows the pass rate in the three years (2019, 2021, and 2022) was generally high in all categories of school ownership. In fact, there were no significant variations in pass rate among the different types of school ownership.

In 2021, there was a slight decrease in the overall performance of schools in S3 Kinyarwanda, with the Total percentage of students who passed decreasing to 87.2%. However, all school categories still had high percentages of students who passed, with the Government-aided schools' category having the highest percentage of 87.3%. The Private and Public schools' categories both had percentages of 87.2% and 87.0%, respectively. In 2022, the Total percentage of students who passed Kinyarwanda increased significantly to 99.6%, which is higher than the percentage in 2019. This indicates a remarkable improvement in the performance of schools in Kinyarwanda. All school categories had very high percentages of students who passed, with the Government-aided, Private, and public schools' categories having percentages of 99.7%, 99.2%, and 99.6%, respectively.

Overall, the data shows that all school categories consistently perform well in Kinyarwanda, with high percentages of students who pass the exam. The differences in performance among different school ownership types are not significant, with all school categories having very high percentages of students who passed the subject in the past three years. Therefore, further analysis is needed to understand the factors that contribute to the high performance of students in Kinyarwanda.

Table 18: Trend pass rate in all S3 Subjects in 2019, 2021 and 2022

S3	2019 (%)	2021(%)	2022 (%)
Mathematics	47.42	78.22	89.04
Physics	43.21	61.82	92.94
Chemistry	38.07	48.98	87.06
Biology	72.54	64.33	96.08
Geography	45.47	65.89	94.08
History	52.94	59.32	90.12
Entrepreneurship	48.11	68.43	92.45
English	69.19	69.33	98.07
Kinyarwanda	94.18	87.23	99.64

Looking at the performance trend of all subjects from 2019 to 2022, it is clear that the pass rate for most of the subjects has significantly increased over the years. In Mathematics, the pass rate has increased from 47.42% in 2019 to 89.04% in 2022, indicating a significant improvement in performance over the years. Physics also showed a significant improvement in performance, from 43.21% in 2019 to 92.94% in 2022.

Chemistry has also shown improvement over the years, with a pass rate of 38.07% in 2019 and 87.06% in 2022. Biology has maintained a relatively high pass

rate, with 72.54% in 2019 and 96.08% in 2022. Geography and History have also shown a significant improvement in performance over the years, with Geography increasing from 45.47% in 2019 to 94.08% in 2022, and History increasing from 52.94% in 2019 to 90.12% in 2022.

Entrepreneurship has also improved over the years, with a pass rate of 48.11% in 2019 and 92.45% in 2022. In English, the pass rate has steadily increased from 69.19% in 2019 to 98.07% in 2022, indicating a consistent improvement in performance. Kinyarwanda has maintained a consistently high pass rate, with 94.18% in 2019, 87.23% in 2021, and 99.64% in 2022, indicating a high level of proficiency in the subject.

Overall, the performance trend in all S3 subjects shows a consistent improvement in performance over the years, with some subjects showing a remarkable improvement in pass rates, while others maintain a consistently high pass rate.

3.3. Analysis of Advanced level National Examinations for 2019, 2021 and 2022

At advanced level, national examination results for 14 subjects were analysed. During the analysis, aspects considered included general performance and pass rate in each subject, pass rate by gender, school ownership and type of school (boarding and day)

General pass rate for all national examinable subjects at Advanced Level (Senior Six)

Candidates	2019		2021		2022	
	%		%		%	
	Number	%	Number	%	Number	%
Registered candidates	50,576	100%	47,638	100%	47,606	100%
Candidates who sat for all exams	46,861	98.6%	47,399	99.5%	47,379	99.6%
Candidates who passed	41,944	89.5%	40,435	85.3%	44,818	94.6%

The table above illustrates the overall pass rates of Senior Six students in the national examinations over a span of three years (2019, 2021, and 2022). According to the table, there was a slight decrease in the total number of registered candidates from 50,576 in 2019 to 47,638 in 2021, and further to 47,606 in 2022. However, the number of candidates who sat for all the exams remained relatively consistent across the three years, with a minor difference.

In terms of the pass rates in the national examinations, the data in the table shows that it was generally high. The pass rate in 2019 stood at 89.5% but slightly reduced to 85.3% in 2021. However, in 2022, the pass rate significantly increased to 94.6%. This suggests a substantial improvement in students' performance during the national examination, particularly in 2022 when the new grading system was implemented. To explore the potential factors contributing to this improvement, investigation can be undertaken.

3.3.1 Pass rate and performance in S6 mathematics national exam

The figure below provides detail of students' pass rate in A-Level Mathematics in general and pass rate by gender for three years 2019, 2021 and 2022.

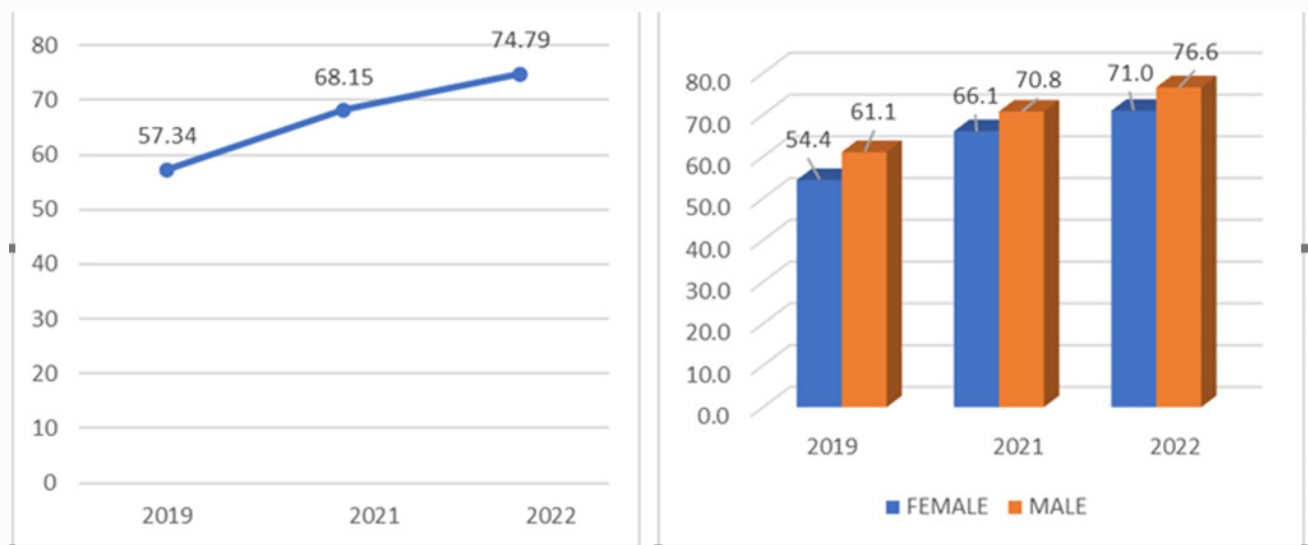


Figure 87: General Pass rate in A-level Maths and pass rate by gender

The general pass rate in Mathematics for 2019, 2021 and 2022 was 57.34%, 68.15%, and 74.79%, respectively. There was a consistent increase in the pass rate for Mathematics over the three years. In 2019, the pass rate was 57.34%, but increased to 68.15% in 2021 and to 74.79% in 2022. This indicates an improvement in the overall performance of students in Mathematics. The increase in pass rate suggests that some strategies were put in place by schools to improve the performance of students in Maths subject. When disaggregated by gender, the trend of increase in pass rate was similar, but the pass rate of male students was relatively higher than female. However, the gap in pass rate between male and female has been narrowing over time, with females showing a significant improvement in their performance from 2019 to 2022. It is important to note that this analysis is based solely on the data provided, and additional factors such as sample size and individual variation should be considered when interpreting these results.

3.3.2 Average score, Variation Coefficient and Standard Deviation in Mathematics

Table 19 below show the average score of students in Maths, deviation of scores from the average and coefficient variation.

Table 19: Average scores, Variation Coefficient and Standard Deviation in Mathematics

	2019	2021	2022
Mean	22.80	30.93	33.80
SD	18.59	22.85	22.71
VC	81.55	73.87	67.19
N	22,988	24,006	23,429

According to the table above, the mean score in Mathematics increased from 22.80 in 2019 to 33.80 in 2022. This suggests an overall improvement on the performance of students in Mathematics over the 3 years. The Standard deviation (SD) in Mathematics increased from 18.59 in 2019 to 22.71 in 2022. This means that despite the increase in performance, there variability in the scores of students in Mathematics also increase. The VC in Mathematics decreased from 81.55 in 2019 to 67.19 in 2022. This suggests that the variability in the students' scores decreased relative to the mean, indicating more consistency in performance. The number of students who sat for maths exam remained relatively consistent over the years. All in all, the data suggest an improvement in the performance of students in mathematics over the years, as indicated by the increase in the mean score.

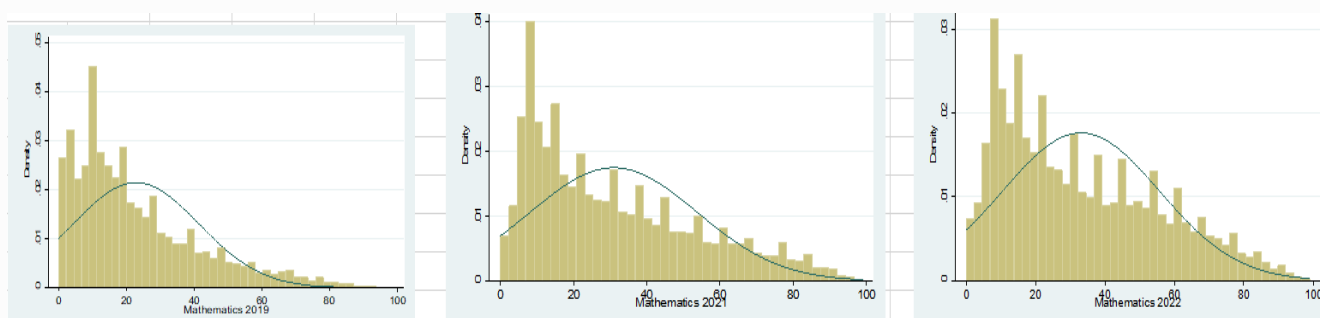


Figure 88: Distribution of Scores in S.6 Mathematics Subject

Based on the nature of the curves in Figure 88 we can say that the distribution of scores in Mathematics subject for Advanced Level follows a non-symmetrical normal distribution curve in each of the three years. In 2019, the scores were in the range of 0 to 40, with only a few scores above 40. This suggests that a significant proportion of students performed poorly in mathematics in 2019. In 2021, the scores were between 0 and 60, with only a few scores above 60, which indicates that there was an improvement in the overall performance of students in Mathematics subject in 2021 compared to 2019 and the same applied to the year 2022. Overall,

the data suggest that there was an improvement in the students' performance in Mathematics from 2019 to 2021, but the performance was still low as evidenced by the mean scores.

3.3.3 Pass rate in S.6 mathematics by School Ownership

The figure below presents the pass rate of students in Entrepreneurship by type of school ownership.

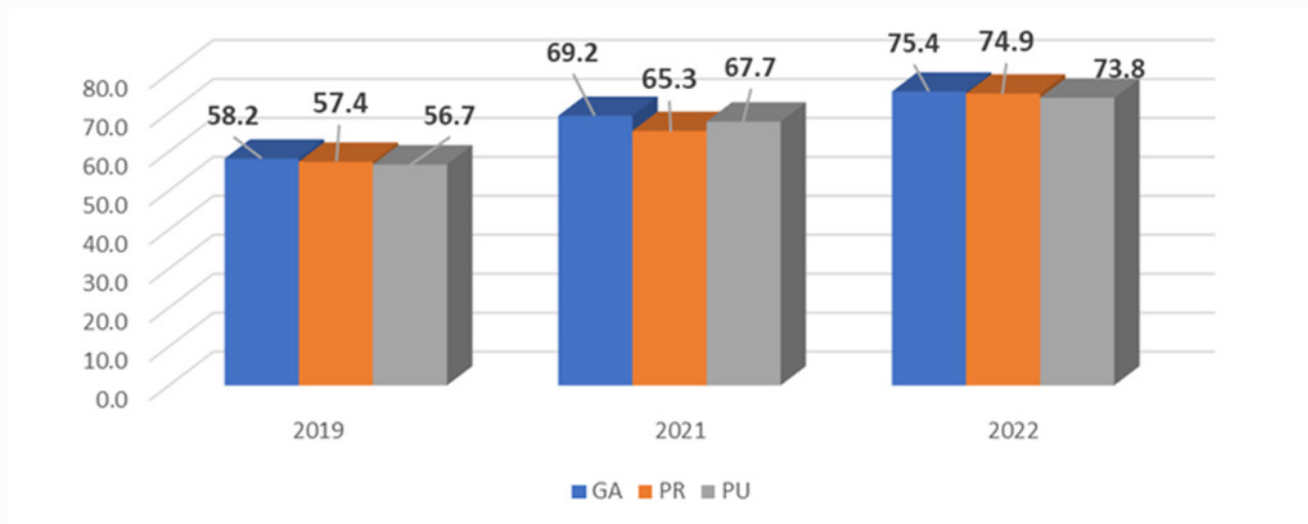


Figure 89: Pass rate in S.6 Mathematics by School Ownership

As indicated in the above figure, in 2019, the pass rate in Mathematics was 58.2% for GA schools, 57.4% for PR schools, and 56.7% for PU schools. This trend continued in 2021 and 2022 with GA schools consistently having the highest pass rates in Mathematics. However, all the three types of school ownership, there was an increase in pass rates in 2021 and 2022. This data suggests that, overall, GA schools had the highest performance in Mathematics, followed by PR and PU schools. The reasons for this improvement could be attributed to various factors such as better teaching methods, increased focus on Mathematics education and facilities in schools. Overall, the data highlights the need for sustained efforts to improve performance in Mathematics across all the types of school ownership.

3.3.4 Pass rate in S.6 Mathematics by type School

The pass rate of students in A-level Mathematics was analysed according to type of school. Type of school in this context refers to boarding and day school.

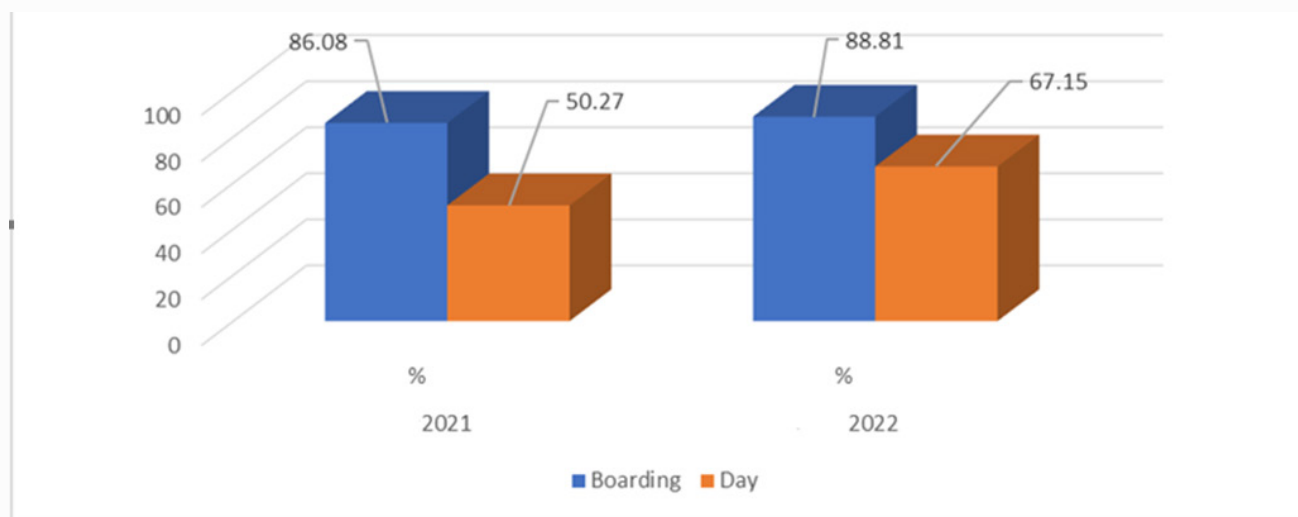


Figure 90: Pass rate in Mathematics by Type School

Based on the data in Figure 90 it is clear that in both Boarding and Day schools there was an improvement in the pass rate in Mathematics in 2022. The pass rate increased from 86.08% in 2021 to 88.81% in boarding schools. In the same way, it rose from 50.27% in 2021 to 67.15% in Day schools. Nonetheless, the pass rate in boarding schools was higher than day schools. This suggests that there may be factors unique to Boarding schools that contribute to better performance in Mathematics, such as sufficient time for self-study or more individualized attention from teachers. There is need to explore the factors that account for differences in pass rate between boarding and day schools.

3.3.5 Pass Rate and performance in S.6 Physics national exam

Figure 91 below presents students' general pass rate in A-Level Physics national exam and pass rate by gender for three years 2019, 2021 and 2022.

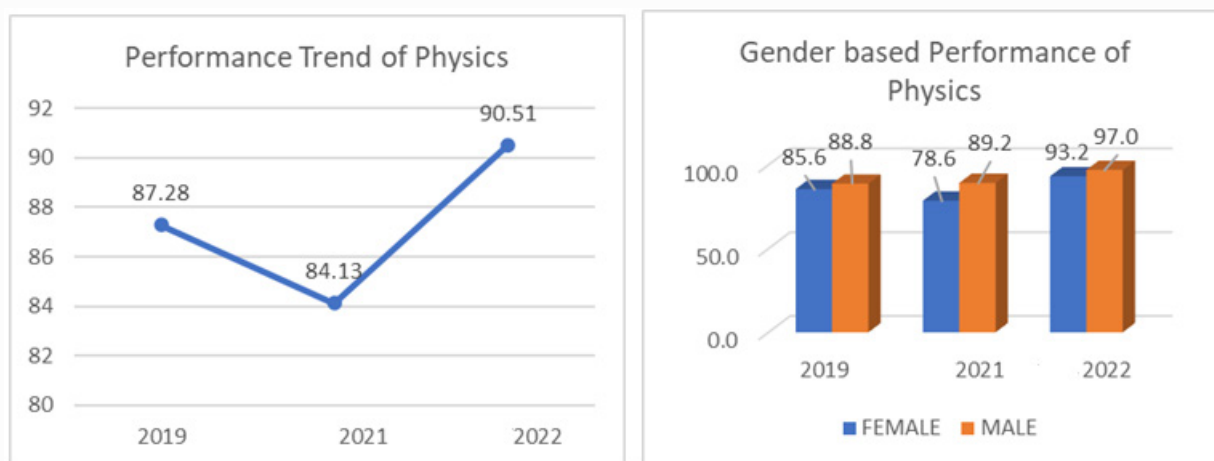


Figure 91: Pass rate trend in Physics and Pass rate by gender

Figure 91 shows that there were variations in students' pass rates in A-level Physics across the three years (2019, 2021 and 2022). The pass rate in 2019 was 87.28%, but it reduced by about 5% in 2021 and sharply increased to 90.51% in 2022. In terms of gender, the trend of pass rate among female students was similar. Nevertheless, the pass rate among male students was consistently increased over the three years, with overwhelming increase among male students (97%) in 2022. In general, the highest pass rate was observed among male students throughout the years. This indicates some fluctuations in the overall performance of students in Physics over the three years.

3.3.6 Average score, Variation Coefficient and Standard Deviation in Physics

Table 19 below show the average scores of students in Physics, stand deviation and coefficient variation for three years.

Table 20: Average score, Variation Coefficient and Standard Deviation in Physics

	2019	2021	2022
Mean	48.03	48.60	51.18
SD	18.00	21.56	18.30
VC	37.47	37.47	35.76
N	8,108	8,602	7,916

As can be seen in Table 20, students' performance in A-level Physics national exams for the three years was generally quite fair with a modest improvement, especially in 2022. The mean scores were almost the same in 2019 and 2021, that is, 48.03 and 48.60 respectively, but in 2022, it slightly increased to 51.18. The standard deviation and coefficient variation scores did, however, vary, and in

2021 the variability was greater than in 2019 and 2022.

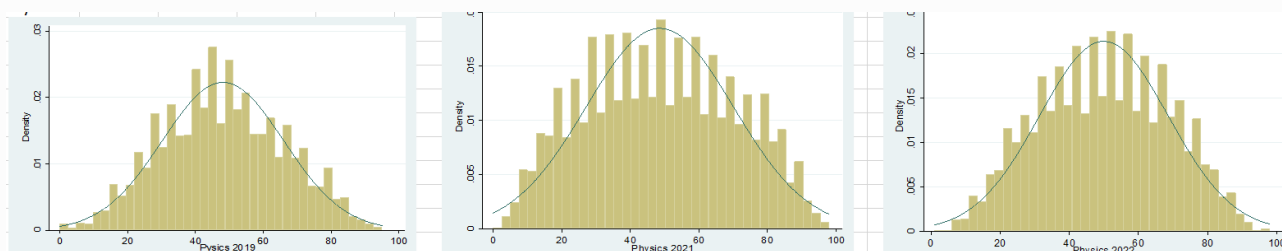


Figure 92: Distributions of Scores in S.6 Physics Subject

Figure 92 shows normal distribution curves with scores in Physics subject national exam distributed on both sides of the curves. This suggests that most students performed fairly with relatively few at the extremes (either high or low). Overall, the data suggests that there has been an improvement in the performance of students in Physics subject between 2019 and 2022, but there is still need for improvement.

3.3.7 Pass Rate in S.6 Physics by School Ownership

Senior six students' results in Physics national exam were analysed according to school ownership and the figure below provides detail of the pass rate.

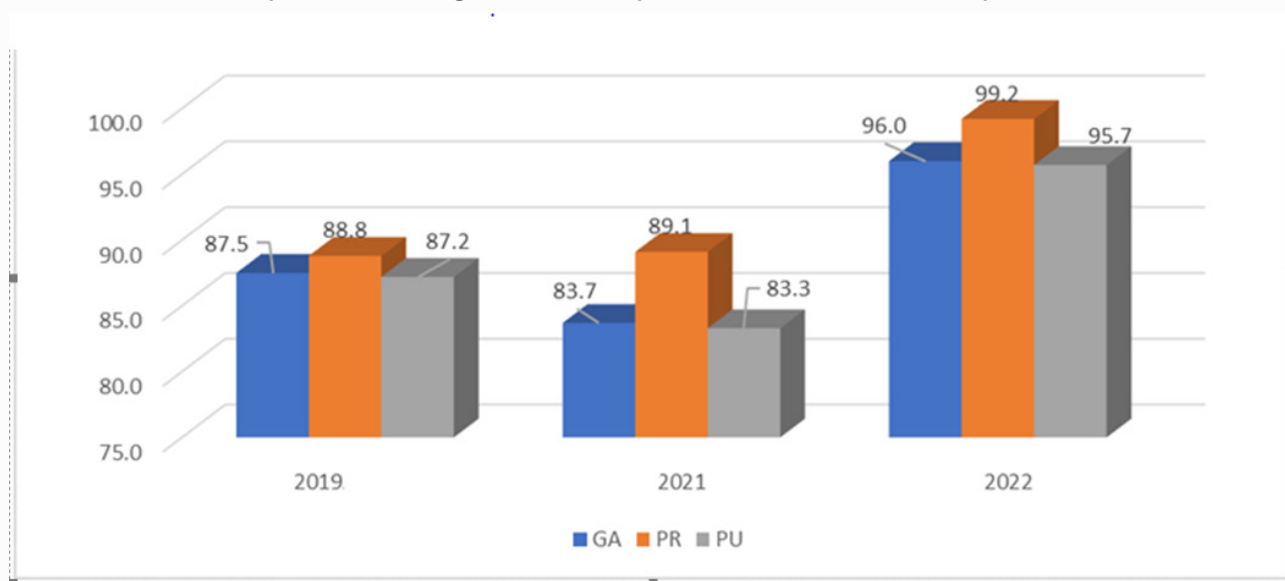


Figure 93: Pass rate in Physics by School Ownership

As indicated in the figure above, the pass rate varied from one year to another and by school ownership, but in private schools, the pass rate was relatively higher in all the three years. In 2019, it was nearly the same in all categories of school ownership. However, in 2021, it slightly reduced by about 5% in government aided and public schools, but remained relatively high in private. In 2022, the pass rate increased significantly in all categories of school ownership. In Government Aided (GA) it was 96.0% while in private and public schools it stood at 99.2% and 95.7% respectively. Overall, there was a general trend of improvement in the performance of students in Physics subject across all the categories of school ownership over the three years.

3.3.8 Pass Rate S.6 physics by type of school

Students' pass rate in physics were analysed by type of school (boarding and day) and the figure below gives detail of the findings.

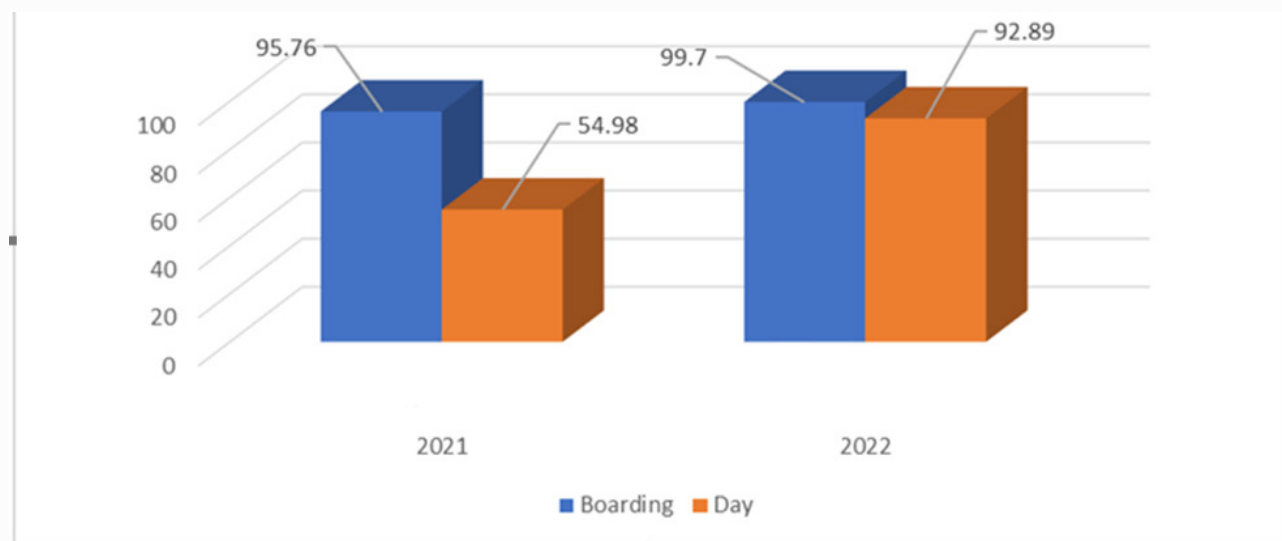


Figure 94: Pass rate in Physics by type of School

Looking at the data in the above figure, boarding schools have the highest pass rate in S.6 Physics exam in the two years and in 2022 there was a great increase in the pass rate, with 99.7% in boarding schools and 92.89% day. The significant improvement in pass rate both boarding and day schools in 2022 implies that efforts were made by teachers and students to improve students' performance, hence increasing the pass rate, but research is needed to explore the reasons behind this increase.

3.3.9 Pass Rate and performance in S.6 Chemistry national examination

Chemistry exam results for S.6 students were analysed and the aspects considered included gender, school ownership and type of school (boarding/day). The figure below presents results of the analysis (pass rate) in general and by gender.

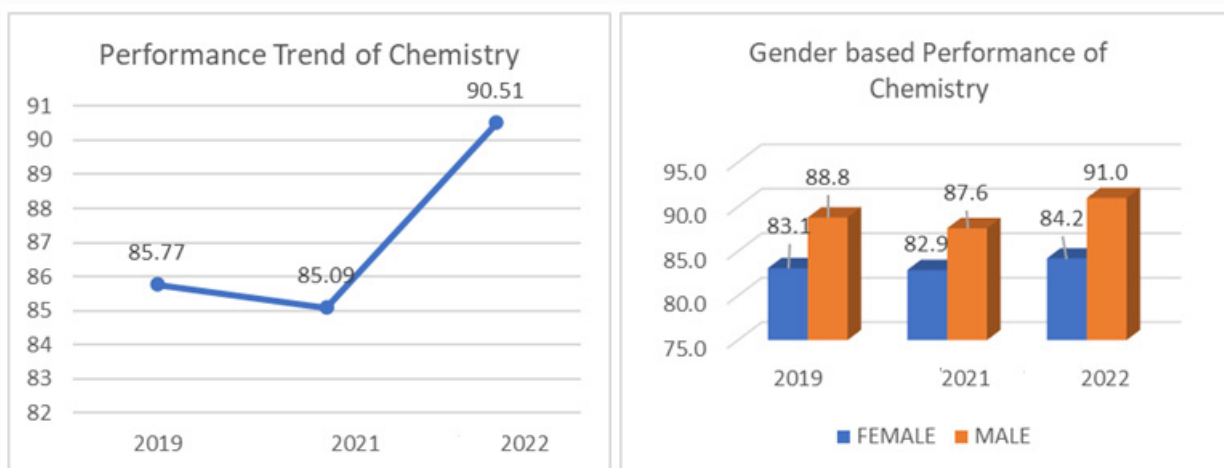


Figure 95: General Pass rate trend in chemistry and pass rate by gender

Figure 95 shows that the pass rate in the three years was generally high, but in 2022, it was very high (90.51%). This suggests that measures may have been taken to improve the overall performance of students in Chemistry. The increase of the pass rate from 2021 to 2022 could be attributed to various factors such as improved teaching methods, better resources and facilities in schools, more focused and dedicated students. In general, the data suggests that the efforts to improve Chemistry education had a positive impact. However, there is still a need for continued efforts to maintain and improve the performance of students in Chemistry in the future. In relation to gender, the pass rate among male and female students was high, but male students performed better than female and therefore had a relatively higher pass rate. Some factors that may contribute to the difference in performance between males and females, which need to be explored.

3.3.10 Average score, Variation Coefficient and Standard Deviation in Chemistry

Table 21 below show the average scores of students in chemistry, stand deviation and coefficient variation for three years.

Table 21: Average score, Variation Coefficient and Standard Deviation in Chemistry

	2019	2021	2022
Mean	48.59	46.17	44.20
SD	16.60	19.45	19.45
VC	34.16	42.12	44.00
N	12,250	12,874	11,946

The mean score in Chemistry decreased from 48.59 in 2019 to 44.20 in 2022, which suggests a decline in the performance of students in Chemistry over the years. However, the Standard deviation (SD) and CV increased from 16.60 in 2019 to 19.45 in 2021 and 2022. These scores were widely spread away from the mean. Overall, the data suggests a decline in the performance of students in Chemistry over the years, as indicated by the decrease in the mean score.

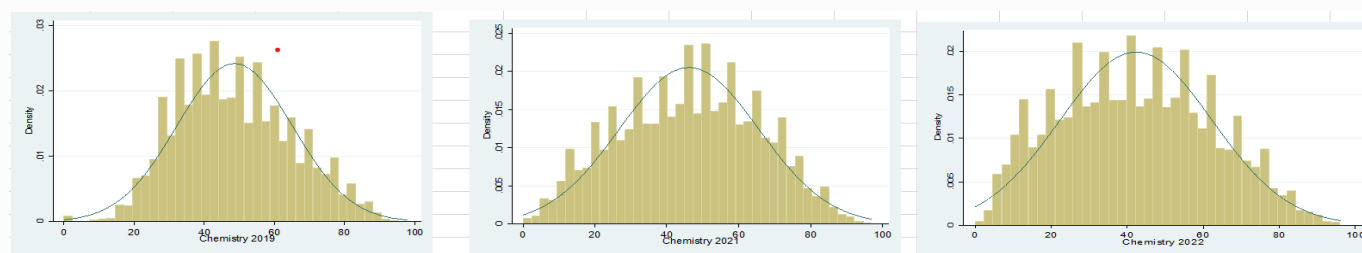


Figure 96: Distributions of Scores in S6 Chemistry Subject

The above curves show that the scores were fairly distribution around the mean, with majority of the scores clustered around the mean and some few at the extremes. It is important to note that the range of scores may be influenced by factors such as the difficulty of the exam, the level of preparation of the students and the quality of teaching. It is important to identify and address any issues that may be affecting the performance of students in Chemistry subject to ensure that they are able to perform to the best of their abilities.

3.3.11 Pass rate in Chemistry by School Ownership

Figure 97 below shows students' pass rate in Chemistry by school ownership.

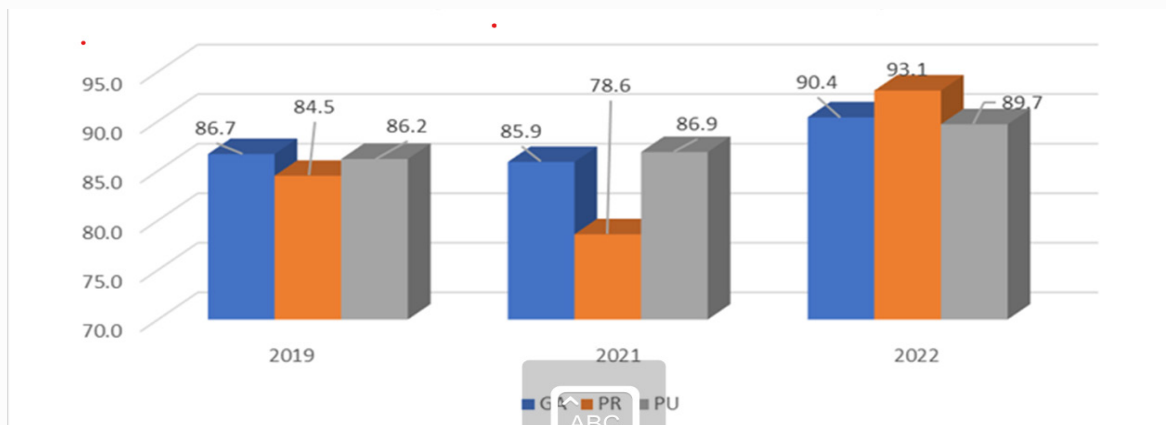


Figure 97: Pass rate in Chemistry by School Ownership

According to the figure above, there was no consistency in pass rate throughout the years. In 2019, the Government aided schools outperformed public and private schools while 2021, public schools performed better than others and in 2022 private emerged the best. This shows that the school ownership status had no major influence on students' pass rate in Chemistry.

3.3.12 Pass rate in Chemistry by School Type

The figure below shows students' pass rate in Chemistry subject by school type.

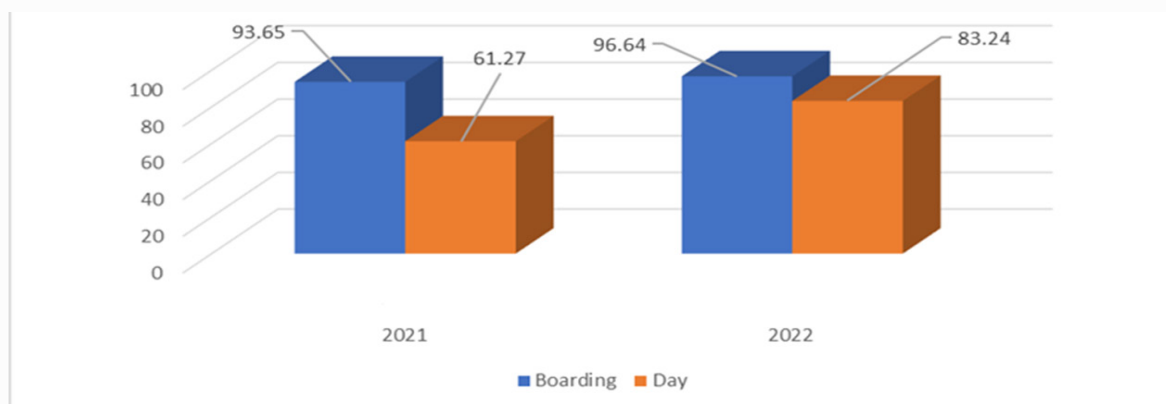


Figure 98: Pass rate of Chemistry by School Type

According to the figure above, in 2021, the percentage of boarding students who passed Chemistry was 93.65%, while the percentage of day students was 61.27%.

Similarly, in 2022, the percentage of students in boarding who passed Chemistry was 96.64% and the percentage of day students who passed was 83.24%. It's important to note that these results could be influenced by several factors such as access to resources, study habits, and motivation. Boarding students may have more access to resources such as libraries, labs, and study groups, which could contribute to their higher performance. However, it's also possible that these results were due to other factors which need further exploration.

3.3.12 Pass rate and performance in S.6 Biology national exams

Biology exam results for S.6 students were analysed and the following were taken into consideration: gender, school ownership and type of school (boarding/day). The figure below presents results of the analysis (pass rate) in general and by gender.

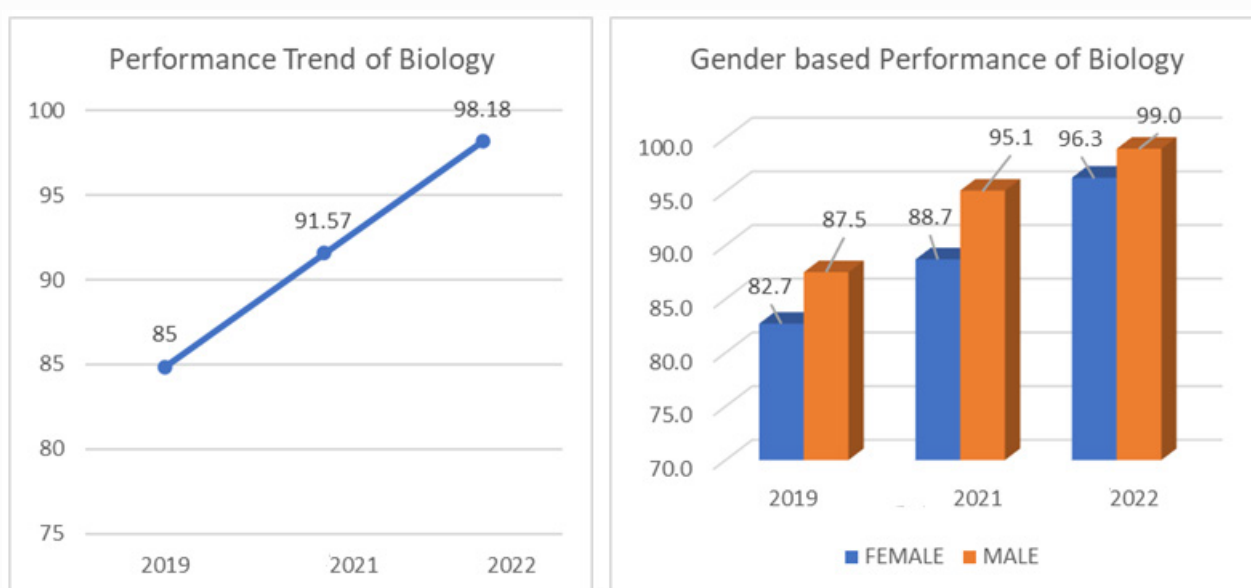


Figure 99: General Pass rate in Biology and Pass rate by gender

Figure 100 shows that there was a significant upward trend in the pass rate for Biology over the three years. In 2019, the pass rate was 85%, which increased to 91.57% in 2021, and further increased to 98.18% in 2022. This indicates a substantial improvement in the overall performance of students in Biology. This increase in pass rate could be attributed to various factors such as improved teaching methods, better infrastructure, and facilities in schools, more focused and dedicated students, and other similar factors. Additionally, the relatively higher pass rate in Biology could also indicate a higher interest and motivation among students towards the subject. In terms of gender, there was a trend of higher performance by male students in Biology compared to female students, across all three years. In 2019, male students had a score of 87.5% compared to female students who had a score of 82.7%. In 2021, male students had a score of 95.1% compared to female students who had a score of 88.7%. In 2022, male students had a score of 99.0% compared to female students who had a score of 96.3%.

3.3.13 Average score and Variation Coefficient and Standard Deviation in Biology

Table 22 provides information about the average score and variability in Biology for three different years, namely 2019, 2021, and 2022.

Table 22: Average score and Variation Coefficient and Standard Deviation in Biology

	2019	2021	2022
Mean	45.83	56.14	58.54
SD	18.81	17.36	17.88
VC	41.04	30.92	30.54
N	10,413	10,998	10,327

As indicated in the table above, the mean score in Biology increased progressively from 45.83 in 2019 to 58.54 in 2022. This suggests a considerable improvement in the performance of students in Biology over the years. The SD and VC show that the scores of students in Biology were more spread away from the mean in 2019 than in 2021 and 2022. Overall, the data suggests a significant improvement in the performance of students in Biology over the years as indicated by the increase in the mean score.

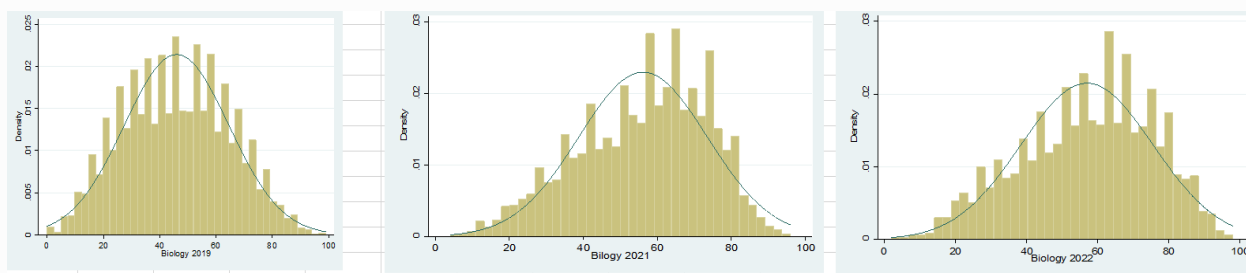


Figure 101: Distribution of Scores in S6 Biology Subject

Figure 101 shows that in 2019, the curve is symmetrical, which means that the scores were evenly distributed around the mean with a few scores on extremes. However, in 2021 and 2022, the curves are asymmetrical- left-skewed and scores are right-skewed, which suggests that the majority of students performed well with scores above the mean, but there were also few students with lower performance pulling the distribution towards the left.

3.3.14 Pass rate in Biology by School Ownership

Figure 102 below shows students' pass rate in Biology by school ownership.

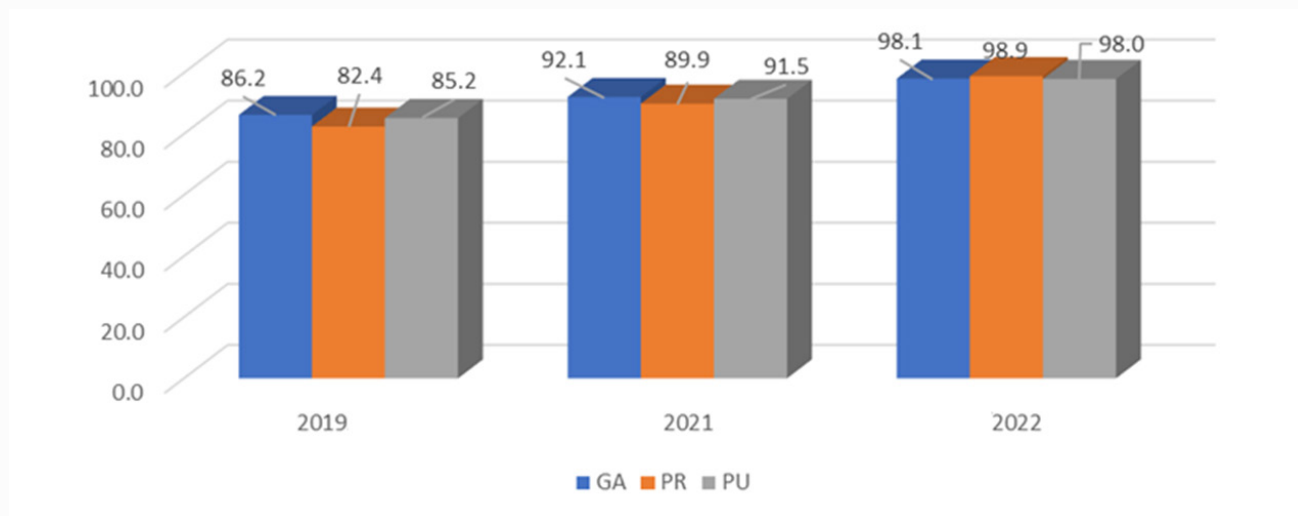


Figure 102: Pass rate in Biology by School Ownership

The figure above indicates that all types of schools performed almost at the same level because there was only a 2% difference in pass rate except in 2019 where private schools performed relatively low compared to government aided and public schools. Government-aided schools performed better than the other schools in 2019 with a student pass rate of 86.2%, 85.2% pass rate for pupils in public schools, and private schools came in last with a pass rate of 82.4%. In 2021, Government aided schools performed better than the rest of the schools with a pass rate of 92.1%, followed by public schools (91.5%) and private schools came last with a pass rate of 89.9%. However, in 2022, Private schools scored better than the rest of the schools, with a pass rate of 98.9%.

3.3.15 Performance of Biology by School type

The figure below shows students' pass rate in Chemistry subject by school type.

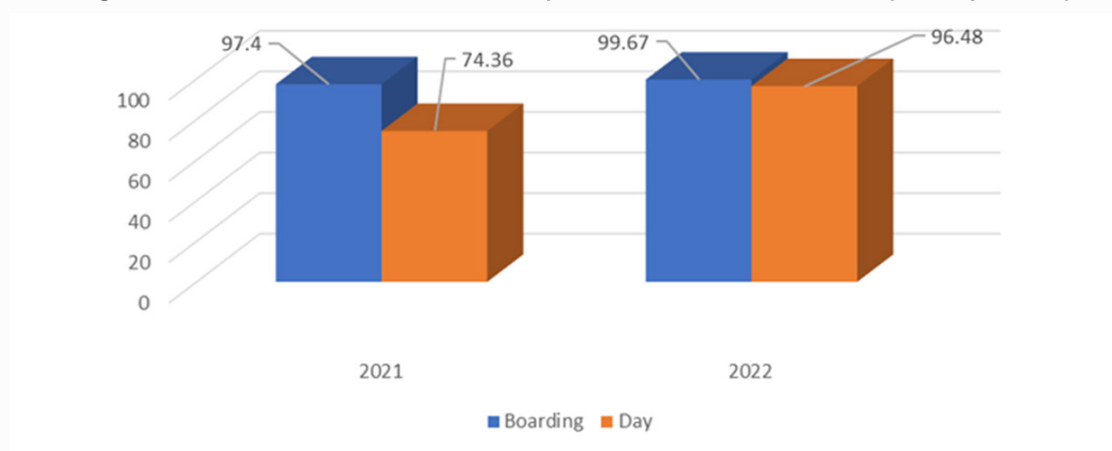


Figure 103: Pass rate of biology by school type

According to the above figure, there was a significant difference in the pass rate of students in Biology subject between boarding and day schools for both 2021 and 2022 national examination academic years. In 2021, students in boarding schools performed better in Biology with a pass rate of 97.4%, compared to students in day schools (74.36%) making a difference of 23.04%. In 2022, the difference was even more significant, with students in boarding schools performing exceptionally well with a pass rate of 99.67% in Biology compared to students in day schools who pass at a rate 96.48%, making a difference of 3.19%. Therefore, it could be inferred that students in boarding schools generally performed better in Biology than students in day schools during the 2021 and 2022 academic years.

3.3.16. General Performance and pass rate in Computer science

Senior six students' pass rate in Computer Science national exam results were analysed and the following aspects were considered: gender, school ownership and type of school (boarding/day). The figure below presents results of the analysis (pass rate) in general and by gender.

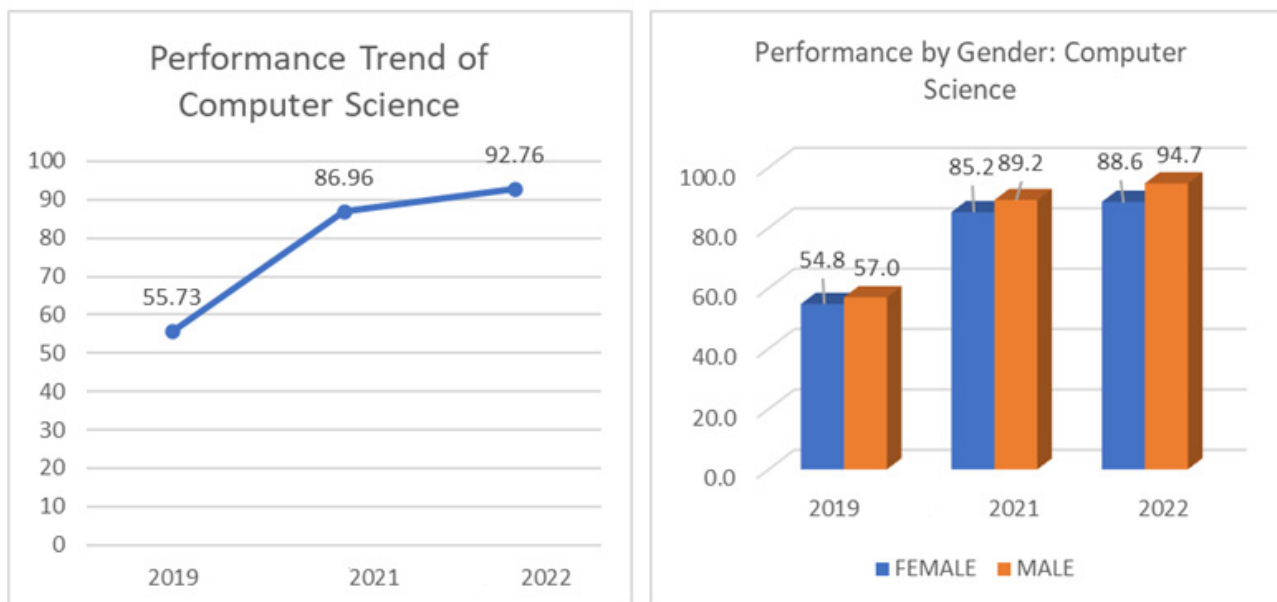


Figure 104: General pass rate trend in Computer Science and Pass rate by gender

Figure 104 shows that students' general pass rate in Computer Science remarkably improved from 55.73% in 2019 to 92.72% in 2022. The pass rate increased significantly by over 30 % from 2019 to 2021 and further increased by about 6 % in the 2022. This trend indicates that there has been a substantial improvement in the teaching and learning of Computer Science in the school. Comparing the pass rate by gender, male students have consistently performed better than female students in all three years. In 2019, the pass rate for male students was 57.0%, while for female students it was 54.8%. Similarly, in 2021, male students had a pass rate of 89.2%, while female students had a pass rate of 85.2%. In 2022, male students had a pass rate of 94.7%, while female students had a pass rate of 88.6%. Therefore, it can be concluded that while there has been an overall improvement

in performance in Computer Science subject over the years, there is still a gender gap in performance, with male students consistently outperforming female students.

3.3.17 Average score and Variation Coefficient and Standard Deviation in Computer Science

Table 23 provides information about the average score and variability in Computer Science for three different years, namely 2019, 2021, and 2022.

Table 23: Average score and Variation Coefficient and Standard Deviation in Computer Science

	2019	2021	2022
Mean	36.78	42.52	44.83
SD	19.74	19.92	18.55
VC	53.68	46.86	41.38
N	4,956	5,706	5,582

From the above table, it is clear that the mean score increased from 36.78 in 2019 to 44.83 in 2022. This indicates an improvement in the performance of students in Computer Science over the years. The standard deviation decreased from 19.74 in 2019 to 18.55 in 2022, which suggests that the distribution of scores became less spread out and more concentrated around the mean. The variation coefficient (VC) also decreased from 53.68 in 2019 to 41.38 in 2022. This further supports the observation that the distribution of scores became less spread out over the years. Overall, the table suggests an improvement in the performance of students in Computer Science, as evidenced by the increase in mean scores and the decrease in standard deviation and variation coefficient. However, further analysis is needed to determine the factors that contributed to this improvement.

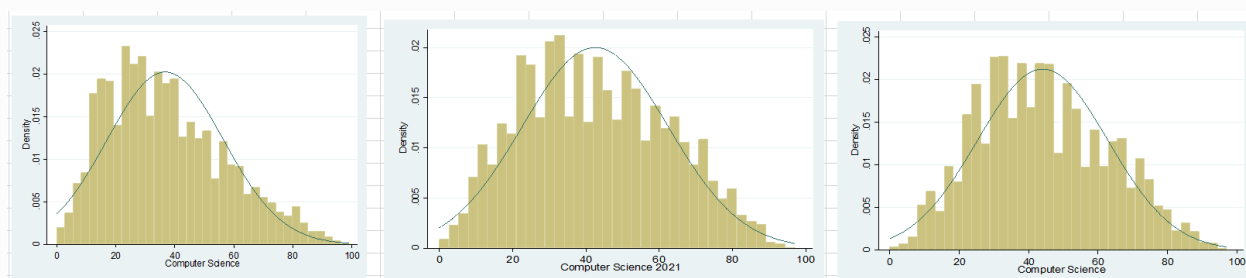


Figure 105: Distribution of Scores in Computer Science

According to Figure 105, majority of students' scores in 2019 are concentrated on the left side of the normal curve, which is skewed towards the right. This means that the majority of the scores were less than the mean, and there are a few high scores more than mean. However, in 2021 and 2022, the distribution seems to be symmetrical, with fewer scores below 10 and above 80. This suggests that

the overall performance of students improved. Overall, the normal distribution of scores in Computer Science subject for Advanced Level in General Education (S6) indicates that many students perform at an average level, with some students excelling and some struggling.

3.3.18 Pass rate in Computer Science by School Ownership

Figure 106 shows the ownership of schools and the percentage of students who passed the Computer Science subject at advanced Level (S6) in 2019, 2021, and 2022

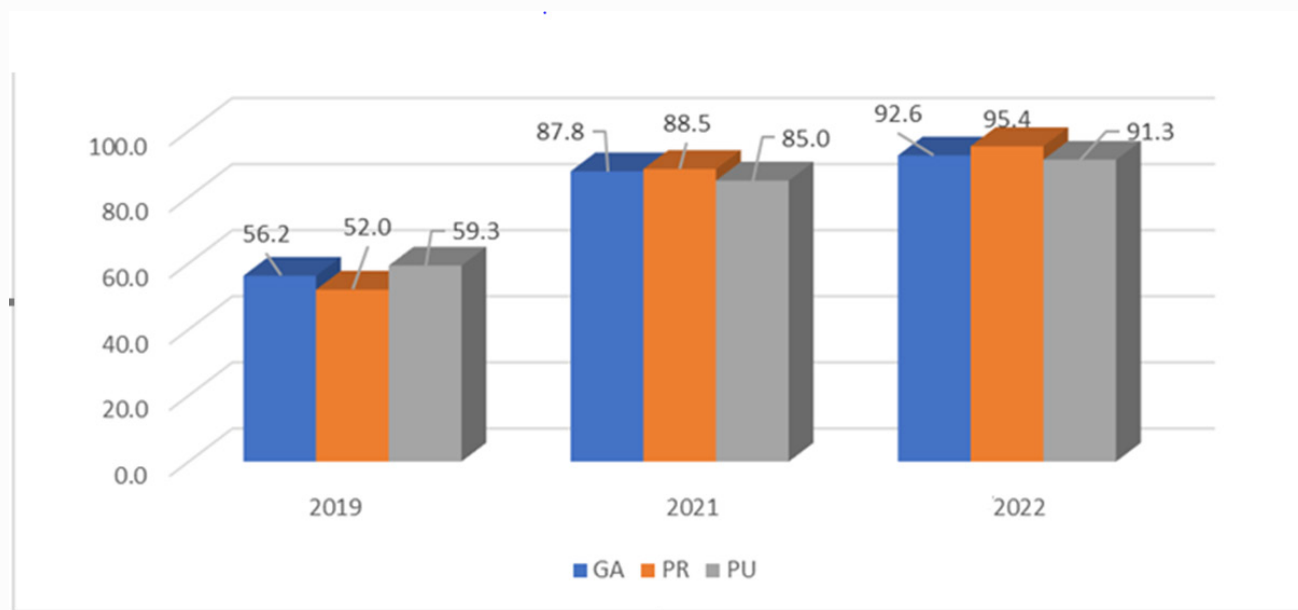


Figure 106:Pass rate in Computer Science by School Ownership

In 2019, the ownership of schools did not have a significant impact on the percentage of students who passed the Computer Science subject. The percentage of students who passed ranged from 52.0% to 59.3%, with Government Aided (GA) schools having the highest pass rate of 56.2%. Similarly, in 2021 and 2022, there was no big difference in the pass rates among the different types of schools though private (PR) schools consistently had a slightly higher pass rates. This suggests that the ownership of schools did not necessarily influence the pass rates of students in the Computer Science subject over time. Private schools may be providing better resources and support to their students, which could be contributing to their higher pass rates. However, it is important to note that other factors such as the quality of teaching and curriculum may also be influencing these results.

3.3.19 Pass rate of Computer Science by School Type

Figure 107 below shows the percentage of students who passed the Computer Science subject at advanced Level (S6) in 2021 and 2022, disaggregated by school type (boarding or day).

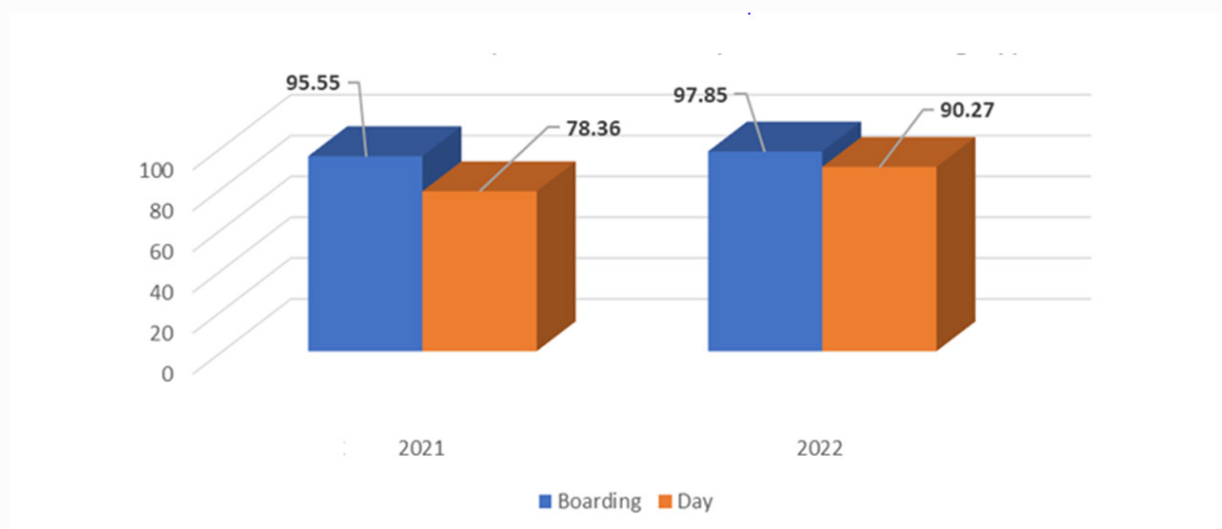


Figure 107: Pass rate of Computer Science by School Type

In both years, the pass rates for boarding students were significantly higher than for day students. In 2021, the pass rate for boarding students was 95.55%, while the pass rate for day students was only 78.36%. Similarly, in 2022, the pass rate for boarding students increased to 97.85%, while the pass rate for day students increased to 90.27%. This difference could be due to several factors: boarding schools may provide more structured study time and support as well as a more immersive learning environment that could help students to excel in the subject. Additionally, boarding students may have fewer distractions and other commitments outside of school, allowing them to focus more on their studies. It is important to note that these results do not necessarily indicate that boarding schools are better for all students or all subjects. Other factors such as the quality of teaching and curriculum may also play a role, and individual student needs and preferences should also be taken into consideration when choosing a school. Overall, the figure suggests that attending a boarding school may be beneficial for students looking to excel in Computer Science subject. However, further research is needed to fully understand the factors contributing to these results and whether they hold true across different subjects and student populations.

3.3.20 General Pass rate and performance in S.6 Geography national exams

Students' pass rate in Geography national exam results were analysed by gender, school ownership and type of school (boarding/day). The figure below presents results of the analysis (pass rate) in general and by gender. Figure 108 below shows the pass rates in the geography subject at Advanced Level (S6) for 2019, 2021, and 2022.

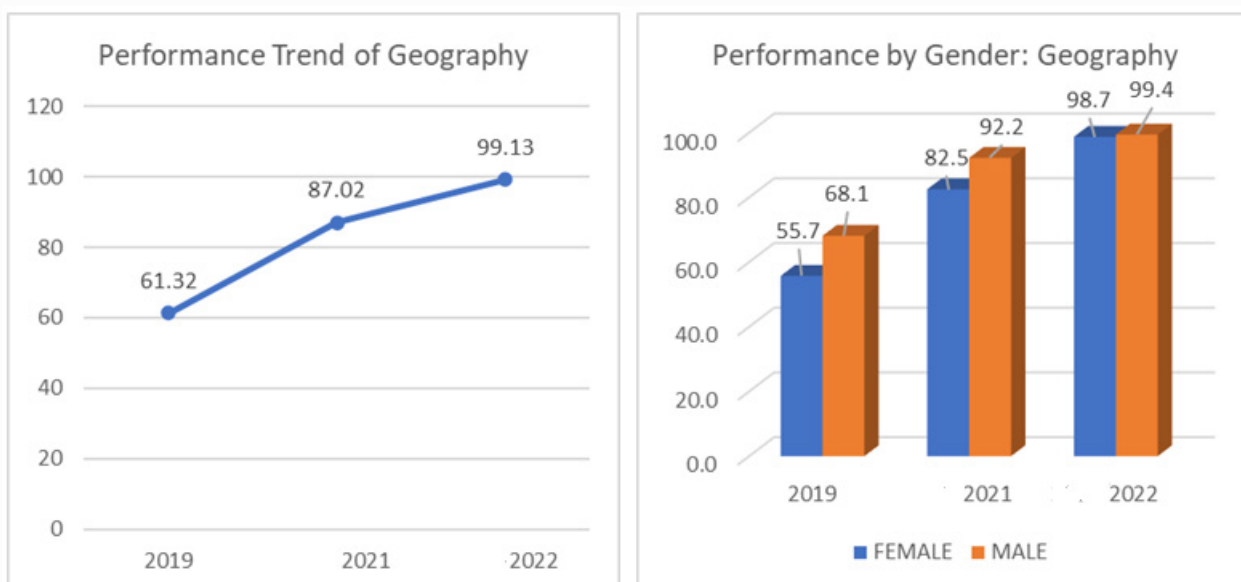


Figure 108: General pass rate trend in Geography and pass rate by gender

As can be seen in the figure above, in 2019, the pass rate in Geography was 61.32%, which was relatively low compared to the pass rates in other subjects. However, there was a significant improvement in the pass rate in 2021, with a percentage of 87.02%. This improvement continued in 2022, with a pass rate of 99.13%. The trend in pass rates over time suggests that there have been improvements in the quality of teaching, curriculum, or other factors that have contributed to better student performance in the geography subject. It is also possible that students have become more familiar with the subject and better prepared for the exams over time. It is important to note that pass rates alone do not provide a complete picture of student learning and achievement. Other factors such as the quality of teaching, curriculum, and assessment methods should also be taken into consideration when evaluating student performance in a particular subject.

In terms of gender, male students had a higher pass rate than female students. For instance, in 2019, the pass rate for male students was 68.1%, while the pass rate for female students was only 55.7%. Similarly, in 2021, the pass rate for male students was 92.2% while the pass rate for female students was 82.5%. In 2022, the pass rate for male students was 99.4% and that of female students was 98.7%. This difference in pass rates between male and female students could be due to several factors, such as differences in learning styles, access to resources and support, or societal expectations and stereotypes. It is important to address these factors and ensure that all students, regardless of gender, have equal opportunities to succeed in their academic pursuits. It is also worth noting that the overall pass rates for Geography have significantly improved over the three years, particularly in 2022 where both male and female students achieved pass rates over 98%. This could be attributed to improvements in teaching and learning methods, as well as increased resources and support for students. In conclusion, the figure highlights the need to address gender disparities in academic performance and provide equal opportunities for all students to succeed. The significant improvements in

pass rates for Geography over the three years are a positive sign and should be further explored to identify the factors contributing to this trend.

3.3.21 Average score, Variation Coefficient and Standard Deviation in Geography

Table 24 below shows the mean, standard deviation (SD), coefficient of variation (CV), and number of students who sat for Geography national exam in 2019, 2021, and 2022.

Table 24: Average score, Variation Coefficient and Standard Deviation in Geography

	2019	2021	2022
Mean	45.74	47.07	64.18
SD	18.48	18.81	16.32
VC	40.41	39.96	25.43
N	20,290	20,259	20,425

According to the table above, the score mean increased from 45.74 in 2019 to 64.18 in 2022, indicating an overall improvement in the variable. The standard deviation and coefficient of variation show that in 2019 and 2021, majority of the scores were highly spread out from them mean, but in 2022, they were concentrated around mean which is a sign for the consistency in scores compared to 2019 and 2021. Overall, the table suggests that there has been an improvement in the variable over time, with an increase in the mean and a decrease in the standard deviation and coefficient of variation. The large sample size also increases confidence in the findings. However, the nature of the variable is not provided in the table, so it is difficult to draw any specific conclusions about the variable itself.

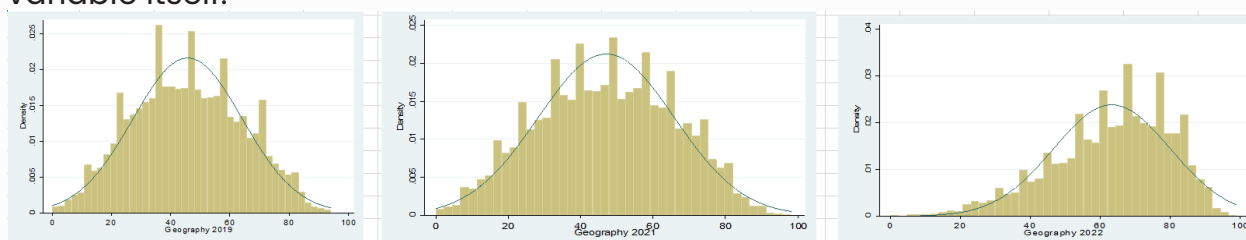


Figure 109: Distribution of Scores in S6 Geography

Figure 109 shows that in 2019, majority of the scores were concentrated in the range of 10 to 80, with a few scores falling below 10 and above 80. In 2021, the distribution remained almost the same, with scores again concentrated in the 10 to 80 range and a few scores falling below 10 and above 80. However, there was an improvement in the scores in 2022, where the distribution shifted to the right, with majority of the scores ranging from 40 to 90. This indicates a significant improvement in the overall performance of students in Geography in 2022 compared to the previous years. The shift in the distribution towards higher scores in 2022 indicates that there has been a significant improvement in the

performance of students in the subject. However, without further information on the specific factors contributing to this improvement, it is difficult to draw any conclusions about the cause of this improvement.

3.3.22 Pass rate in S.6 Geography by School Ownership

Figure 110 shows the pass rate of students in Geography by school ownership for three years – 2019, 2021, and 2022.

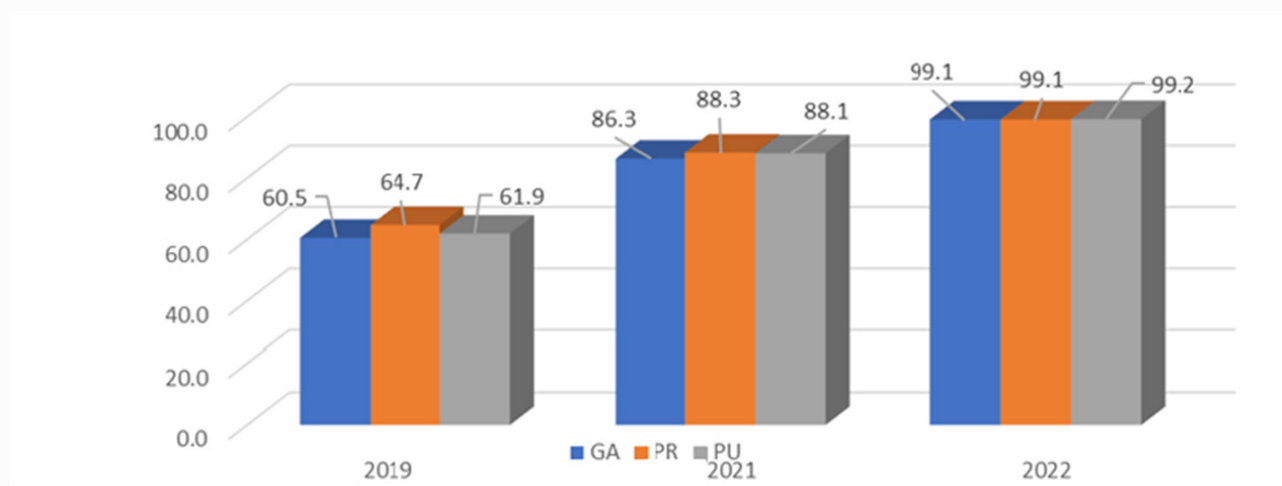


Figure 110: Pass rate in Geography by School Ownership

The above figure shows that in 2019, the pass rates for Geography were relatively similar across categories of school ownership, that is, ranging from 60.5% in Government Aided schools to 64.7% in Private schools. However, in 2021 and 2022, there was a significant improvement in the pass rates in all ownership categories. In 2021, the pass rates ranged from 86.3% in Government Aided schools to 88.3% in Private schools. In 2022, the pass rates improved further, ranging from 99.1% in all the three school ownership categories. Overall, the data suggests that there has been a significant improvement in the pass rates for Geography across all ownership categories over the three years. Without further information on the specific factors contributing to this improvement, it is difficult to draw any conclusions about the cause of this improvement. However, the data suggests that all the categories of school ownership categories performed well in Geography.

3.3.23 Pass rate in S.6 Geography by School Type

Figure 111 below shows the percentage of students who passed Geography national exam at advanced Level (S6) in 2021 and 2022, disaggregated by school type (boarding or day).

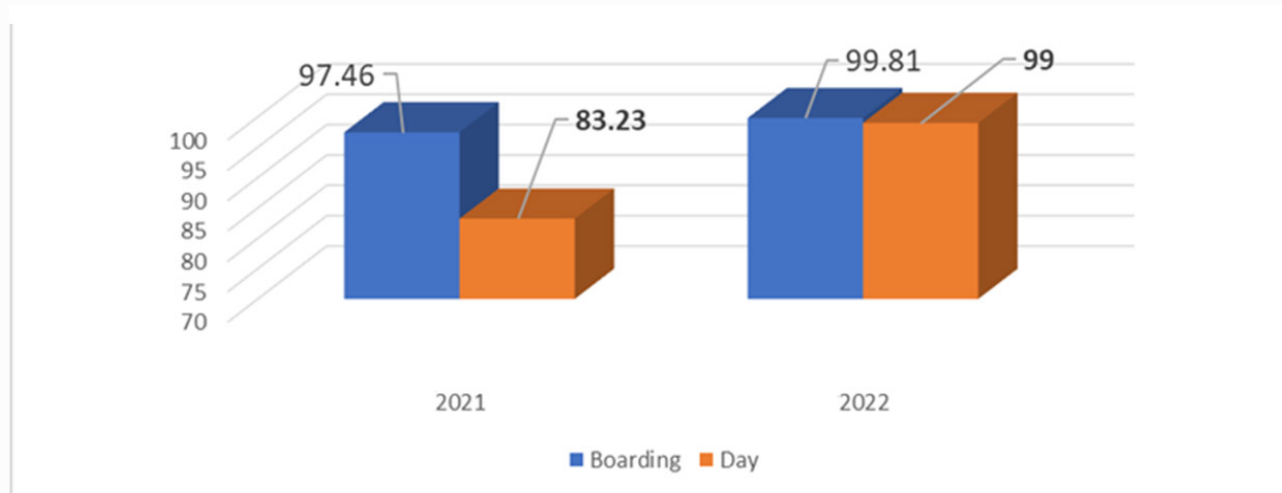


Figure 111: Pass rate in S.6 Geography by School type

The figure above shows that in 2021, the pass rate in Geography was much higher among boarding school students, at 97.46%, compared to 83.23% for day school students. Similarly, in 2022, the pass rate in Geography was again much higher among boarding school students, at 99.81%, compared to 99% for day school students. These results suggest that boarding schools may be providing a more conducive learning environment for Geography than day schools. This could be due to a range of factors, including greater access to resources, more structured study time, and a greater focus on academic achievement. However, without further information, it is difficult to draw any firm conclusions about the cause of this difference. Overall, the data suggests that there was a significant difference in the pass rates for Geography between boarding and day schools. This information could be useful for education policymakers, who may wish to investigate further to determine the factors underlying this difference, and consider ways to address any disparities in academic outcomes between different types of schools.

3.3.24 General Pass rate and performance in S.6 History National Exam

Students' pass rate in History national exam results were analysed according to gender, school ownership and type of school (boarding/day). The figure below presents results of the analysis (pass rate) in general and by gender. Figure 112 below shows the pass rates in the History subject at Advanced Level (S6) for 2019, 2021, and 2022.

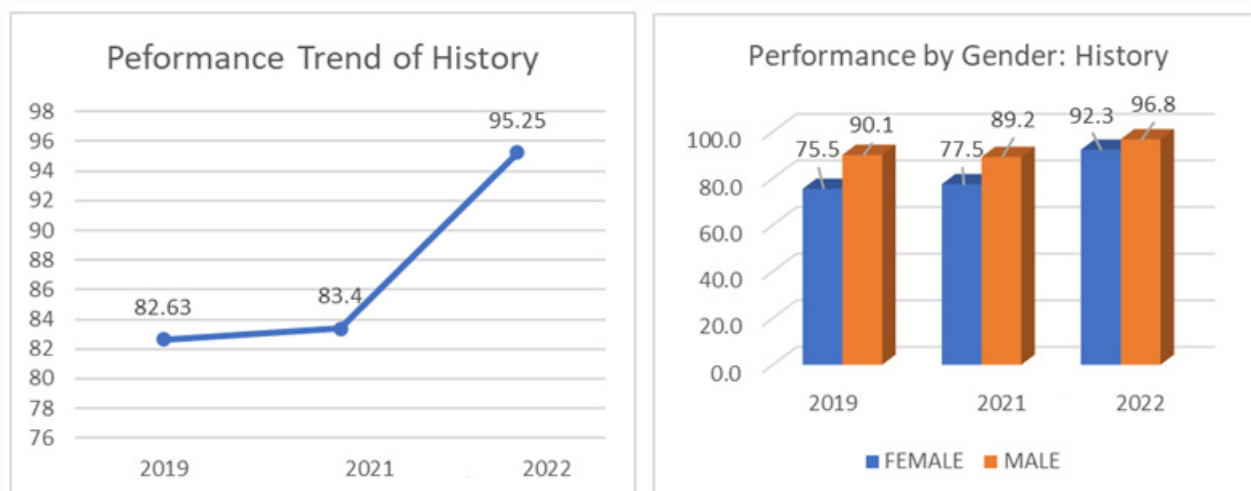


Figure 112: Pass rate trend in History and pass rate by gender

The above figure shows the pass rates in History among S6 students over a three-year period, from 2019 to 2022. In 2019, the pass rate for History was 82.63%. The pass rate remained relatively stable in 2021, with a slight increase to 83.4%. However, in 2022, the pass rate in History increased significantly to 95.25%. This trend suggests that there may have been some improvement in the teaching of History in 2022 that led to the significant increase in the pass rate. Overall, the figure indicates a positive trend in the pass rates for History among S6 students, with a significant increase in 2022. This information could be useful for educators and policymakers in determining the effectiveness of teaching and assessment strategies for History, and identifying areas where improvements could be made to further improve student outcomes.

In relation to gender, there was a gender gap in the performance in the History subject. In all three years, male students outperformed female students. In 2019, the pass rate for male students was 90.1%, while for female students it was 75.5%. In 2021, the pass rate for male students was 89.2%, and for female students it was 77.5%. Moreover, in 2022, the pass rate for male students was 96.8%, while for female students it was 92.3%. The difference in pass rates between male and female students is quite significant, and it may be worth investigating the factors contributing to this gender gap and exploring strategies to address it.

3.3.25 Average score, Variation Coefficient and Standard Deviation in History

Table 25 presents the average score, standard deviation, variation coefficient, and number of students for History across three academic years (2019, 2021, and 2022).

Table 25: Average score, Variation Coefficient and Standard Deviation in History

	2019	...2021	...2022
Mean	43.33	41.28	53.15
SD	22.55	20.85	18.85
VC	52.04	50.52	35.47
N	9,157	8,897	9,072

The mean score for History in the above table shows a slight decrease from 43.33 in 2019 to 41.28 in 2021 and then a significant increase to 53.15 in 2022. This suggests that students performed better in History in 2022 than in the previous years. The SD decreased from 22.55 in 2019 to 20.85 in 2021 and then further decreased to 18.85 in 2022. This means that the variation in scores among students decreased over time, indicating greater consistency in student performance. The VC decreased from 52.04% in 2019 to 50.52% in 2021, and then significantly decreased to 35.47% in 2022, which implies that the variation in scores as a percentage of the mean score decreased significantly in 2022 compared to the previous years. Overall, the table suggests that students performed better in History in 2022 compared to the previous academic years. These changes could be attributed to various factors, such as improved teaching methodologies or better preparation of students for the subject. The data presented in this table could be useful in monitoring and evaluating student performance in History over the time and identifying areas where improvement could be made to enhance student outcomes.

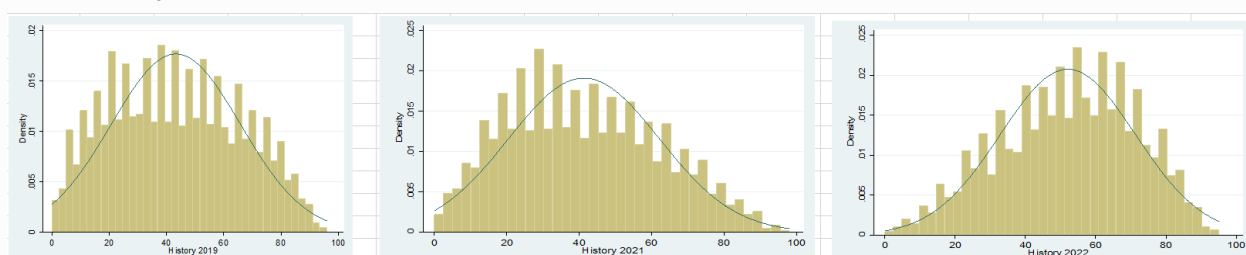


Figure 113: Distribution of Scores in S6 History Subject

The above figure shows that the scores in History for 2019, 2021 and 2022, fall in a normal distribution curve, but the scores were more concentrated around the mean in 2022 than in 2019 and 2021. Overall, this distribution suggests that the scores in History were less consistent, especially in 2019 and 2021, but in 2022 they were clustered around mean and relatively consistent.

3.3.26 Pass rate in S.6 History by School Ownership

Figure 114 shows the pass rate of students in History by school ownership for three years – 2019, 2021, and 2022.

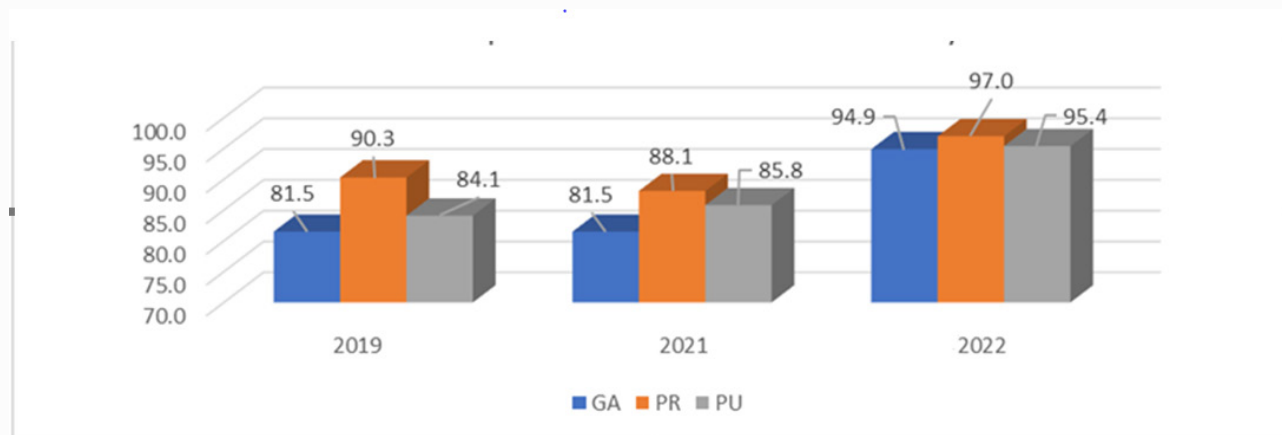


Figure 114: Pass rate in History by School Ownership

Looking at the data in Figure 114, the overall pass rate in History improved significantly, especially in 2022. In 2019, the pass rates for all types of schools were above 80%, but by 2022, the pass rates improved to over 90% for all school types. Private schools (PR) generally had the highest pass rate performed in all three years while government aided schools (GA) had the lowest. However, it is worth noting that all types of schools showed improvement in their pass rates from 2019 to 2022. It is important to note that these results are based on the pass rates alone and do not provide any information about the quality of education or the factors that may have contributed to the changes in performance over time.

3.3.27 Pass rate in History in Boarding and Day schools

Figure 115 below shows the percentage of students who passed History national exam at advanced Level (S6) in 2021 and 2022, disaggregated by school type (boarding or day).

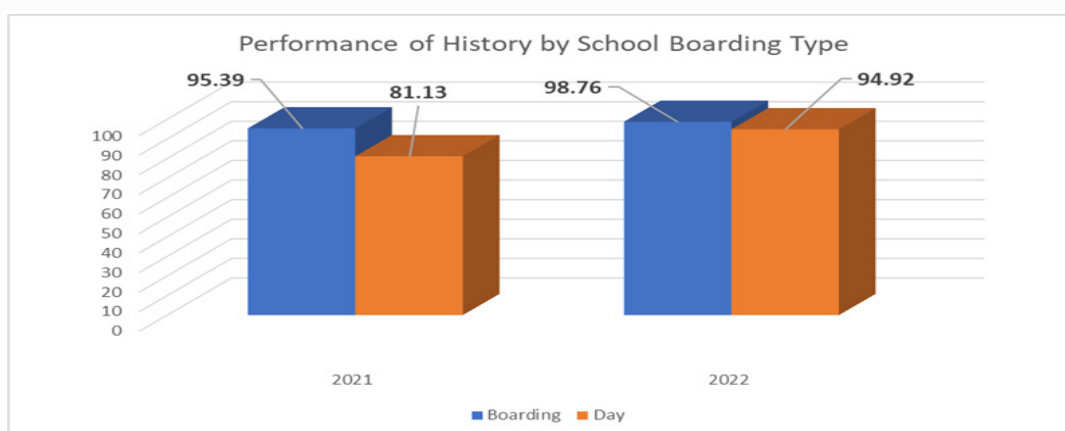


Figure 115: Pass rate in History by School Type

From the figure above, it is evident that in the two years (2021 and 2022), the pass rate in boarding schools was relatively higher than in day. For instance, in 2021 it was 95.39% while in day it was 81.13%. In 2022, there was a significant increase in the percentages of both boarding and day schools. The Pass rate in boarding schools increased to 98.76% and in day school it also increased to 94.92%.

3.3.27 General Performance and pass rate in S6 Entrepreneurship national exam

The pass rate of students in Entrepreneurship national exam results was analysed according to gender, school ownership and type of school (boarding/day). The figure below presents results of the analysis (pass rate) in general and by gender. Figure 116 below shows the pass rates in Entrepreneurship at Advanced Level (S6) for 2019, 2021, and 2022.

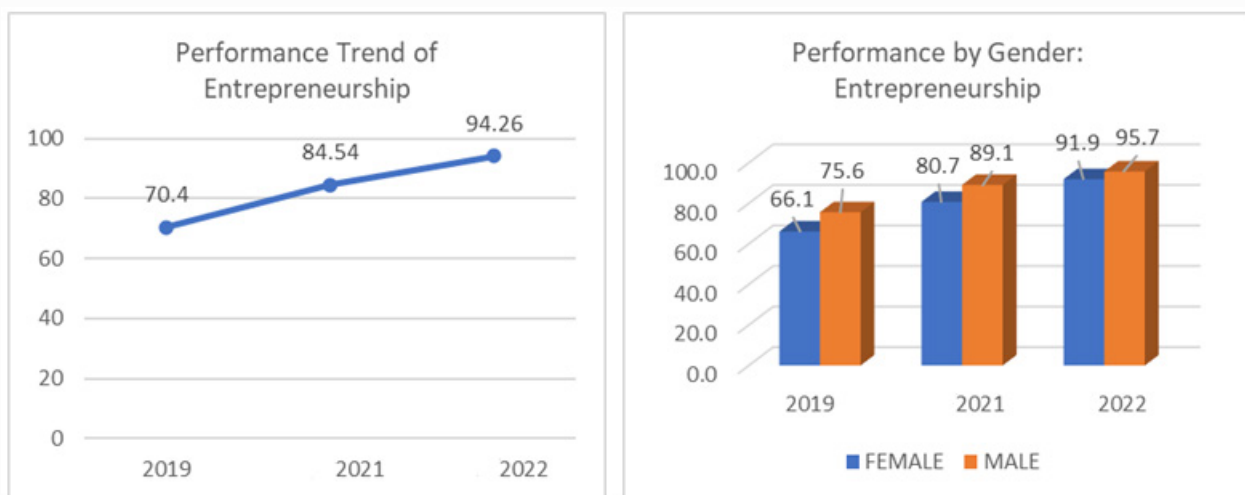


Figure 116: Pass rate trend in S6 Entrepreneurship and pass rate by gender

In 2019, the pass rate for the Entrepreneurship subject for S6 was 70.4%, but increased to 84.54% in 2021 and then to 94.26% in 2022. This indicates that the performance trend in the Entrepreneurship subject has been consistently improving over the years. Concerning gender, the data shows that pass rate amongst female and male students in Entrepreneurship has been consistently improving over the three years, but male students performing relatively higher than female. However, there was a significant gender gap in pass rates in 2019, which gradually narrowed in the following years. Overall, the data suggests that schools made efforts to improve the performance of students in the Entrepreneurship subject, and commendable results are evident in the increase in pass rates.

3.3.28 Average score and Variation Coefficient and Standard Deviation in Entrepreneurship

Table 25 presents the average score, standard deviation, variation coefficient, and number of students for History across three academic years (2019, 2021, and 2022).

Table 26: Mean score, SD and CV of scores in Entrepreneurship

	2019	2021	2022
Mean	42.98	41.73	58.77
SD	18.83	20.39	23.03
VC	43.82	48.87	39.19
N	46,951	47,425	46,027

The table 12 shows the average score, standard deviation, variation coefficient, and the number of students (N) in the Entrepreneurship subject for three academic years (2019, 2021, and 2022). In 2019, the mean score in Entrepreneurship was 42.98, with a standard deviation of 18.83 and a variation coefficient of 43.82. The variation coefficient indicates that there was a moderate amount of variation in the scores, and the standard deviation shows that the scores were somewhat spread out around the mean. The total number of students who took the exam was 46,951.

In 2021, the mean score decreased slightly to 41.73, with a higher standard deviation of 20.39 and a variation coefficient of 48.87. This indicates that there was more variation in the scores compared to the previous year, and the standard deviation shows that the scores were more widely spread around the mean. Overall, the data shows that the mean score in Entrepreneurship increased significantly in 2022, compared to the previous two years. However, there was more variation in the scores, indicating that some students did very well, while others did not perform as well. The increase in the mean score may be due to various factors such as improved teaching methods, better learning resources, or changes in the curriculum. The variation coefficient and standard deviation highlight that the distribution of the scores is not uniform, and there is a wide range of scores among the students who took the exam.

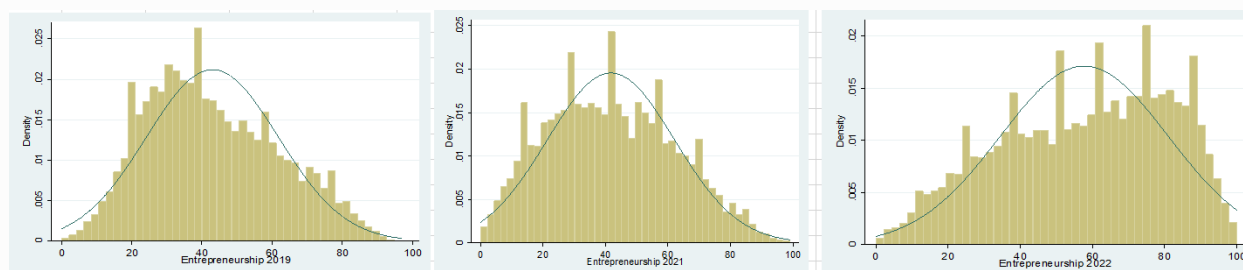


Figure 117: Distribution of Scores in S6 Entrepreneurship Subject

The data presented in the above shows the distribution of scores in the Entrepreneurship subject for Advanced Level in General Education (S6) for three academic years (2019, 2021, and 2022) using a normal distribution curve. In 2019, the majority of the students' scores in Entrepreneurship were concentrated in the range of 20 to 80. A few scores were below 20 and a few others above 80. This indicates that some students did not perform well while others performed exceptionally well. In 2021, the distribution of scores in Entrepreneurship was more spread out than in 2019, with scores concentrated in the range of 10 to 80. There were a few scores below 10 and a few scores above 80, which indicates that some students performed poorly when some others performed well. In 2022, the distribution of scores in Entrepreneurship was even more spread out, with scores concentrated in the range of 20 to 100. There were a few scores below 20, but many of the scores were higher than 80. This shows that more students performed exceptionally well. Overall, the data shows that there was a consistent improvement in the students' performance in Entrepreneurship subject over the three academic years. The normal distribution curve shows that there were still some students who did not perform well, but many of them performed well. Also, more students performed exceptionally well in 2022 compared to the previous two years.

3.3. 29 Pass rate in Entrepreneurship by School Ownership

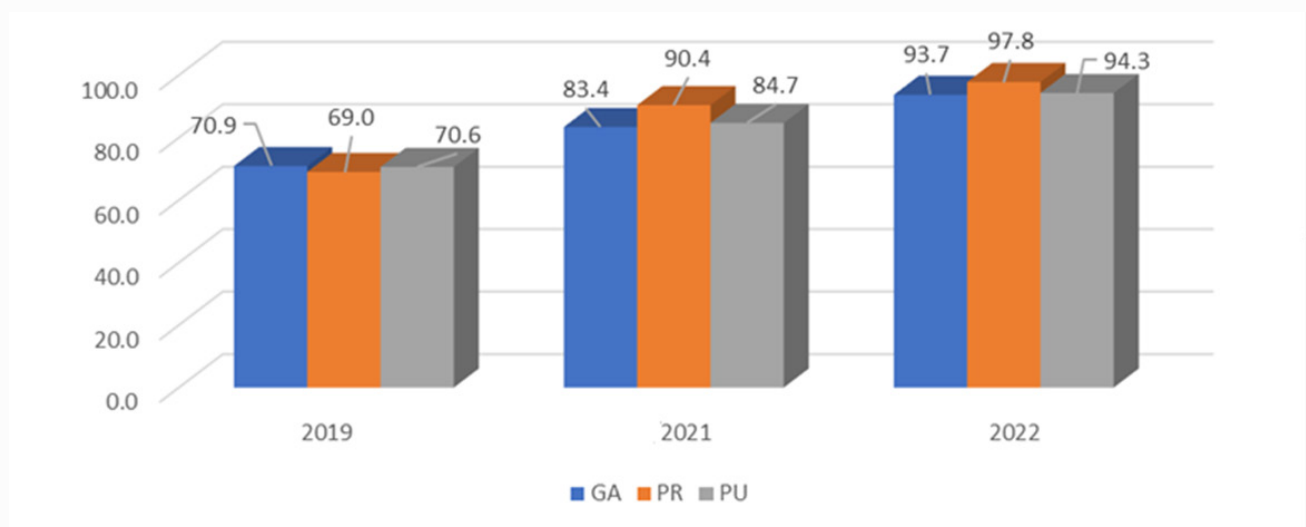


Figure 118: Pass rate in Entrepreneurship by School Ownership

Figure 118 presents the pass rates for the Entrepreneurship subject for different types of schools based on ownership types: Government Aided (GA), Private (PR), and Public (PU) in three academic years (2019, 2021, and 2022). In 2019, the pass rate for Entrepreneurship in Government Aided (GA) schools was 70.9%, while for Private (PR) and Public (PU) schools, it was 69.0% and 70.6%, respectively. This shows that there was not much difference in pass rates among the different types of schools in 2019. In 2021, the pass rate for Entrepreneurship in Private (PR) schools increased significantly to 90.4%, while for Government Aided (GA) and Public

(PU) schools, it increased to 83.4% and 84.7%, respectively. This indicates that Private (PR) schools performed better than Government Aided (GA) and Public (PU) schools in 2021. In 2022, the pass rate for Entrepreneurship in Private (PR) schools increased even more significantly to 97.8%, while for Government Aided (GA) and Public (PU) schools, it increased to 93.7% and 94.3%, respectively. This indicates that Private (PR) schools continued to perform better than Government Aided (GA) and Public (PU) schools in 2022. Overall, Private (PR) schools consistently outperformed Government Aided (GA) and Public (PU) schools in Entrepreneurship over the three academic years. The data also shows that all the types of schools consistently improved their pass rates in Entrepreneurship over the three academic years. This suggests that efforts to improve entrepreneurship education were effective across all the 3 types of schools. However, Private (PR) schools achieved exceptional improvement in pass rates in 2022.

3.3.30 Pass rate in Entrepreneurship by School Type

Figure 119 below shows the percentage of students who passed Entrepreneurship national exam at advanced Level (S6) in 2021 and 2022, disaggregated by school type (boarding or day).

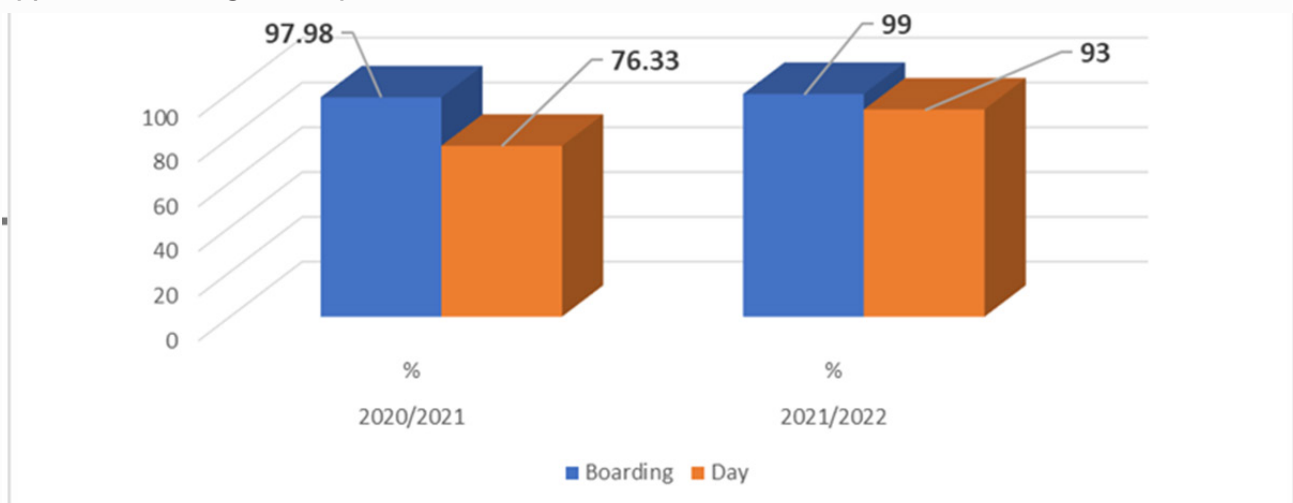


Figure 119: Pass rate of Entrepreneurship by School Type

Figure 119 indicates that the pass rates for Entrepreneurship in national exams are higher for students in boarding schools compared to those in day schools. In 2021, the pass rate for Entrepreneurship was 97.98% for boarding school students. This score is significantly higher than the pass rate of 76.33% achieved by students in day schools. Similarly, in 2022, the pass rate for Entrepreneurship was 99% for boarding-scholars, which is higher than the pass rate of 93% achieved by day-scholars. One possible reason for this difference could be the learning environment and resources available in boarding schools. These schools generally provide students with a more structured and focused learning environment, where students have access to resources and support that are not in day schools. Additionally, boarding schools may have more dedicated and experienced teachers who can provide more personalized attention to students. However, there may be other

factors that contribute to the performance difference between boarding and day schools. Thus, further research is required to identify and address any issues behind this situation.

3.3.31 General Performance and pass rate in S6 in Economics national exam

The Economics national exam results were analysed according to gender, school ownership and type of school (boarding/day). The figure below presents pass rate in general and by gender.

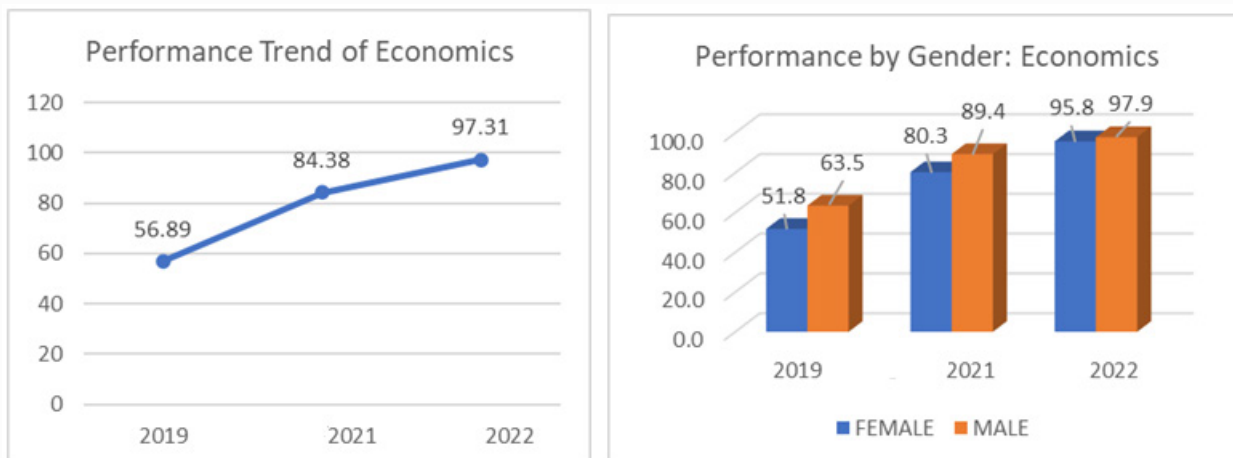


Figure 120: Pass rate trend in Economics and pass rate by gender

As depicted in the above figure, in 2019, the pass rate for the subject in S6 was 56.89%, which is relatively low. However, in the following two academic years, there was a remarkable improvement in the pass rate. In 2021, the pass rate increased to 84.38%, which is a visible improvement from the previous year. However, in 2022, the pass rate increased to 97.31%.

In relation to gender, both male and female candidates improved their performance in Economics in the 3 past years. In 2019, the pass rates were lower for both male and female students. The pass rate was 51.8% for females and 63.5% for males. However, in the following academic years, both groups achieved better scores. In 2021, the pass rate increased to 80.3% for females and 89.4% for males. In 2022, the pass rate increased to 95.8% for females and to 97.9% for males.

Overall, the trend in performance of Economics in S6 was positive, as there was a significant increase in the pass rate over the past 3 years. Possible reasons for the improvement could include improved teaching and learning methods, increased access to resources, and better preparation for national exams. Nevertheless, research is required to determine the factors underlying this sustainable improvement.

3.3.32 Average score and Variation Coefficient and Standard Deviation in Economics

Table 27 portrays the average scores, standard deviation and variation coefficient for Economics subject for three school years (2019, 2021 and 2022).

Table 27: Average score and Variation Coefficient and Standard Deviation in Economics

	2019	2021	2022
Mean	41.15	38.20	56.48
SD	17.10	17.53	17.27
VC	41.55	45.90	30.58
N	21,835	22,211	22,441

As indicated in Table 27, students' performance in Economics varied according to school year. In 2019, the mean score for Economics was 41.15, which decreased slightly to 38.20 in 2021. However, in 2022, the mean increased to 56.48. The standard deviation (SD) remained relatively constant across the three years with the values of 17.10 in 2019, 17.53 in 2021, and 17.27 in 2022. The distribution of scores in Economics was visibly consistent across the three years. However, the variation coefficient (VC) revealed a different trend. In 2019, the VC was 41.55%. In 2021 it increased to 45.90% and significantly decreased to 30.58% in 2022. Overall, the trend in average scores and variation coefficient for Economics subject in the national exams is somewhat mixed. While there has been a significant increase in the mean score in 2022, there was a decrease in the mean score in 2021. Additionally, the variability in scores increased in 2021 but decreased significantly in 2022. Therefore, an in-depth investigation may be necessary to identify and address any factors that contribute to these trends.

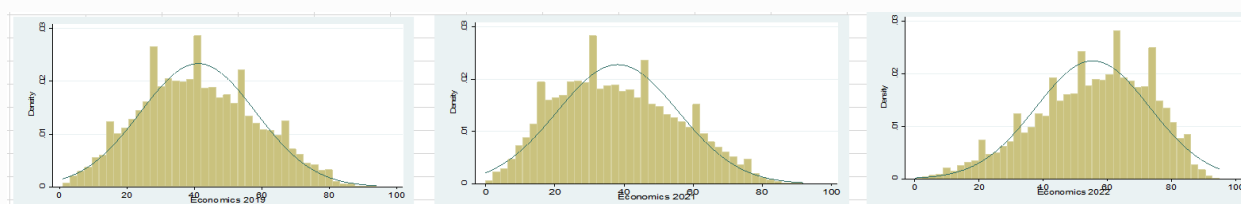


Figure 121: Distribution of Scores in Economics Subject

From the information above, it is clear that there was some variability in the distribution of scores for Economics subject in the past three academic years. In 2019, the distribution of scores in Economics was concentrated between the range of 10 to 80, with few scores below 10 and few scores above 80. This suggests that many students scored within this range, with only a small percentage of students scoring below or above this range. Similarly, in 2021, the distribution of scores was concentrated between the range of 10 to 80, with few scores below 10 and above 80. Thus, many students scored within this range, with only a small percentage of students scoring below or above this range.

However, in 2022, the distribution of scores was somewhat different. The scores were concentrated between 20 and 90, with a few scores below 20 and a few scores above 90. This suggests that many students scored within this range, with only a small percentage of students scoring below or above this range. Overall, the trend in the distribution of scores for Economics subject in the national exams shows that there were variations in the concentration of scores in different ranges over the three years. It is important to identify and address factors that contributed to these variations.

3.3 33 Pass rate in Economics by School Ownership

Figure 112 shows students' pass rate in Economics in the three years considered (2019, 2021 and 2022) according to the types of school ownership, that is Public, Government aided and private.

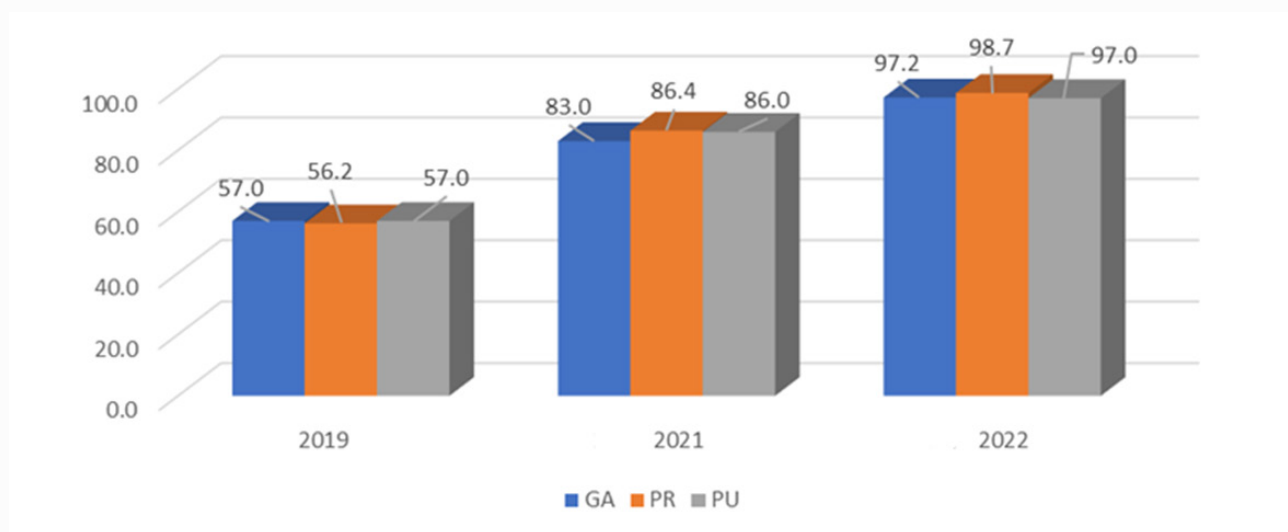


Figure 122: Pass rate of Economics by School Ownership

As can be seen in the above figure, in 2019, students in Government Aided (GA) schools pass at a rate of 57%, followed closely by students in Private (PR) and Public (PU) schools with 56.2% and 57% respectively. In 2021, there was an improvement on the pass rate in all school ownership categories. Students in Private schools had the highest pass rate 86.4% followed by students in public schools with 86% and students in Government Aided schools with 83%. In 2022, there was a further improvement in the pass rate in all school ownership categories. Students in Private schools passed at a rate of (98.7%) followed by public schools (97%), and Government Aided schools (97.2%). This data clearly shows that there was a consistent improvement in the performance of students in Economics across all school ownership categories over the past three academic years. Hence, it is important to identify and address factors that contributed to this improvement such as differences in teaching and learning methods, quality of teaching staff, availability of resources and support for students.

3.3.34 Pass rate of Economics in Boarding and Day schools -

Figure 123 provides students' pass rate in Economics for both Boarding and Day schools over the past two academic years

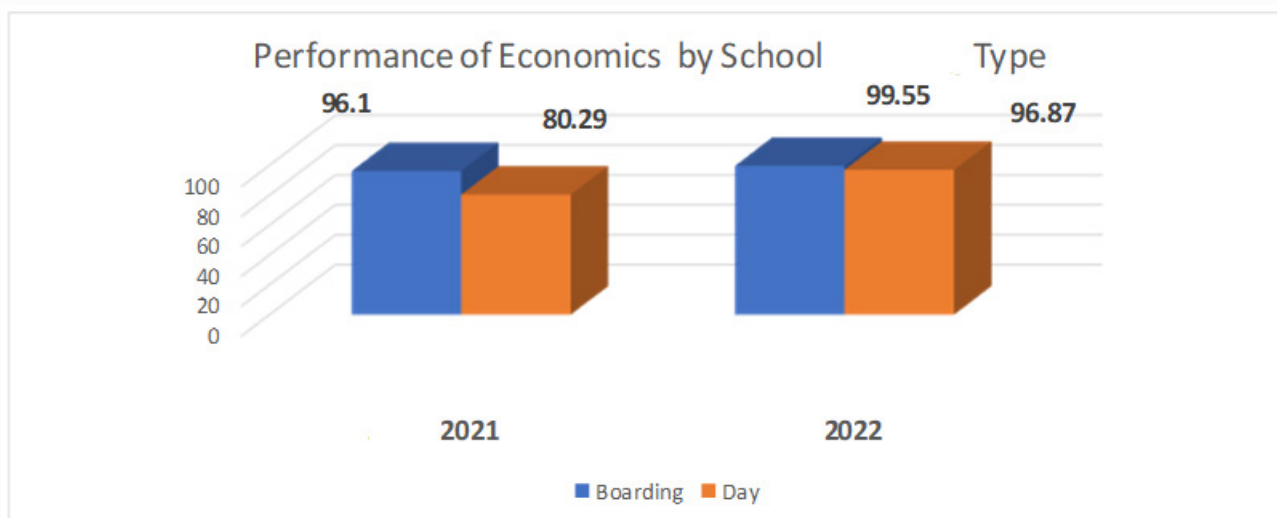


Figure 123: Pass rate of Economics in Boarding and Day schools

According to the figure above, in 2021, boarding schools had a pass rate (96.1%) higher than Day (80.29%). In 2022, there was a significant improvement in the pass rates for both Boarding and Day schools. Boarding schools had a pass rate of 99.55% while Day schools had a pass rate of 96.87%. Overall, the pass rates for both Boarding and Day schools improved significantly between 2021 and 2022. Boarding schools had a higher pass rate in both years, but the gap between Boarding and Day schools narrowed significantly in 2022. This suggests that efforts were made to address factors that were contributing to the lower pass rates for Day schools, such as differences in teaching and learning methods, access to resources and support, and the quality of teaching staff. It is important to continue monitoring and analyzing the performance of students in Economics subject in both Boarding and Day schools to identify any ongoing issues and to continue addressing any factors that may negatively impact students' performance.

3.3.35 Pass rate and performance in Literature in English

The results of students in Literature in English national exam results were analysed and computed according to gender, school ownership and type of school (boarding/day). The figure below presents the pass rates in general and by gender.

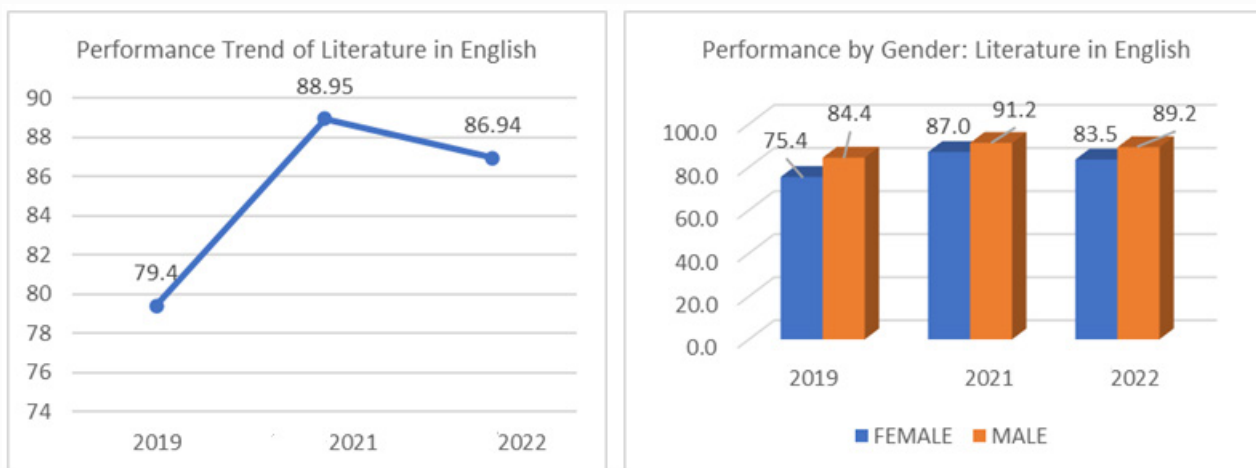


Figure 124: Pass rate trend in Literature in English and pass rate by gender

The figure shows that the pass rates in Literature in English subject for S6 students was generally high over the three school years. In 2019, the pass rate was 79.4%, but improved significantly to 88.95% in 2021, slightly decreased to 86.94% in 2022. Concerning gender, in 2019, the pass rate for Literature in English subject was higher among male students with a pass rate of 84.4%, compared to a pass rate of 75.4% among female students. In 2021, both male and female students saw an improvement in their pass rates, with female students achieving a pass rate of 87% and male students achieving a pass rate of 91.2%. In 2022, the pass rate for Literature in English subject decreased slightly for both male and female students. However, male students still had a higher pass rate with 89.2% compared to a pass rate of 83.5% among female students. Overall, the data suggests that male students have consistently performed better than female students in Literature in English subject over the past three academic years. However, both male and female students have seen improvements in their pass rates over the years, which is a positive trend. It is important to continue to provide equal opportunities and support for all students to succeed in Literature in English subject, regardless of gender.

3.3.36 Average score and Variation Coefficient and Standard Deviation in Literature in English

Table 28 portrays the average scores, standard deviation and variation coefficient of scores in Literature in English for three school years (2019, 2021 and 2022).

Table 28: Mean, SD and VC of scores in Literature in English

	2019	2021	2022
Mean	35.19	34.33	41.71
SD	18.06	17.36	19.06
VC	51.32	50.56	45.69
N	11,636	10,870	10,213

Based on the data in the above table, the performance of students in Literature in English subject was generally low. In 2019, the mean score for Literature in English subject was 35.19, with a standard deviation of 18.06 and a variation coefficient of 51.32. This suggests that there was a relatively wide range of scores among students, with a high degree of variation from the average score. In 2021, the mean score for Literature in English subject slightly decreased to 34.33, with a standard deviation of 17.36 and a variation coefficient of 50.56. Although there was a decrease in mean score, the standard deviation and variation coefficient remained relatively consistent with the previous year. In 2022, the mean score for Literature in English subject increased significantly to 41.71, with a standard deviation of 19.06 and a variation coefficient of 45.69. This indicates that there was still some variation in student performance, but the overall performance of students in the subject has improved significantly from the previous years. Overall, the data suggests that there has been some variation in student performance in Literature in English subject over the past three academic years. However, there has also been a significant improvement in mean score and a decrease in the variation coefficient in the most recent academic year. It is important to continue monitoring and analyzing student performance in Literature in English subject to identify areas for improvement and to ensure that all students have access to high-quality education and achieve their full potential in the subject.

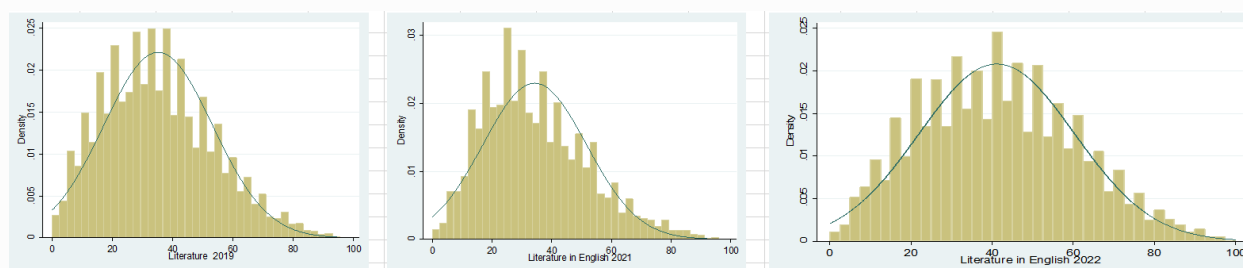


Figure 125: Distribution in Scores in Literature in English

Based on the information provided in the figure above, the distribution of scores in Literature in English is even, but there were high variations from the mean score in all three years (2019, 2021, and 2022). This suggests that many students scored in the middle range of the distribution, with relatively few scorings very low or very high. It is worth noting that the normal distribution curve is a theoretical model, and, there may be some deviation from this pattern. Additionally, it is not clear from the information provided whether the distribution of scores is skewed in any direction, or whether there are any outliers or other anomalies that may affect the analysis. Therefore, further investigation and analysis would be needed to fully understand the distribution of scores in Literature in English subject for Advanced Level General education (S6).

3.3.37 Pass rate in Literature in English by School Ownership

Students pass rate by school ownership was analysed and the following table shows details of the distribution according to public, private and government aided.

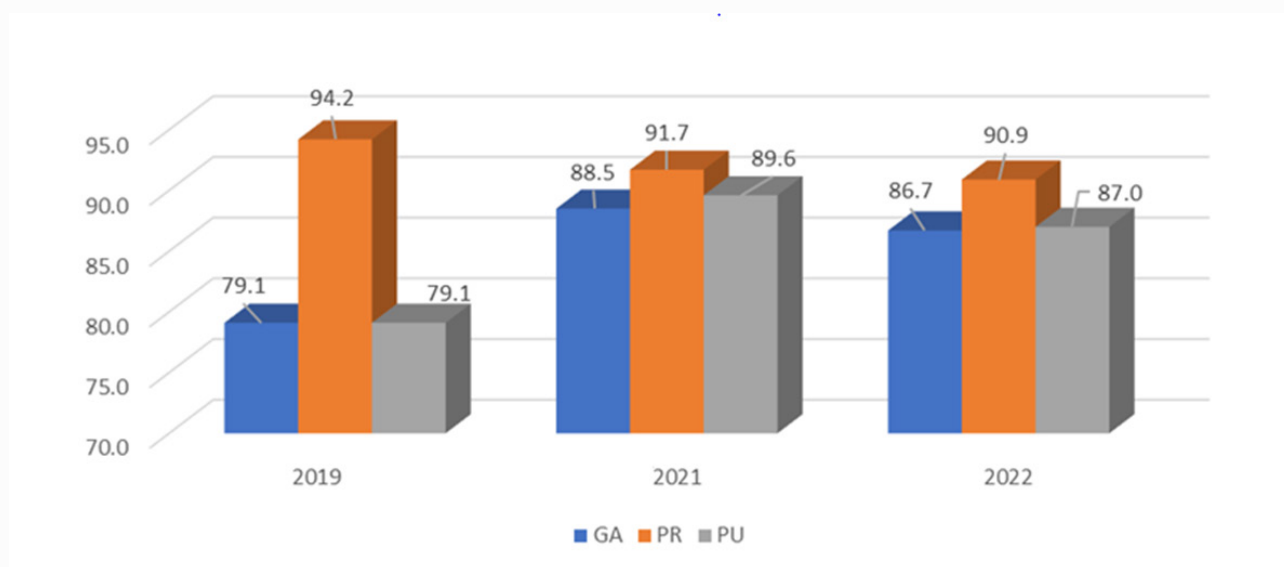


Figure 126: Pass rate in Literature in English by School Ownership

The figure above shows that in 2019, the highest pass rate was recorded in Private schools (94.2%), followed by Government Aided schools (79.1%) and public schools (79.1%). In 2021, the highest pass rate was recorded in Private schools (91.7%), followed by public schools (89.6%) and Government Aided schools (88.5%). In 2022, the highest pass rate was recorded in Private schools (90.9%), followed by Government Aided schools (86.7%) and public schools (87.0%). Overall, Private schools have consistently recorded the highest pass rates in Literature in English over the three years, followed by Government Aided schools and then public schools. However, we can also observe a slight decrease in the pass rates for Private schools from 2019 to 2021, followed by a slight increase in 2022. On the other hand, Government Aided and Public schools have shown an increase in pass rates from 2019 to 2021, but a slight decrease in 2022.

3.3.38 Pass rate of Literature in English in boarding and day schools

The figure below presents students' pass rate in Literature between boarding and day schools.

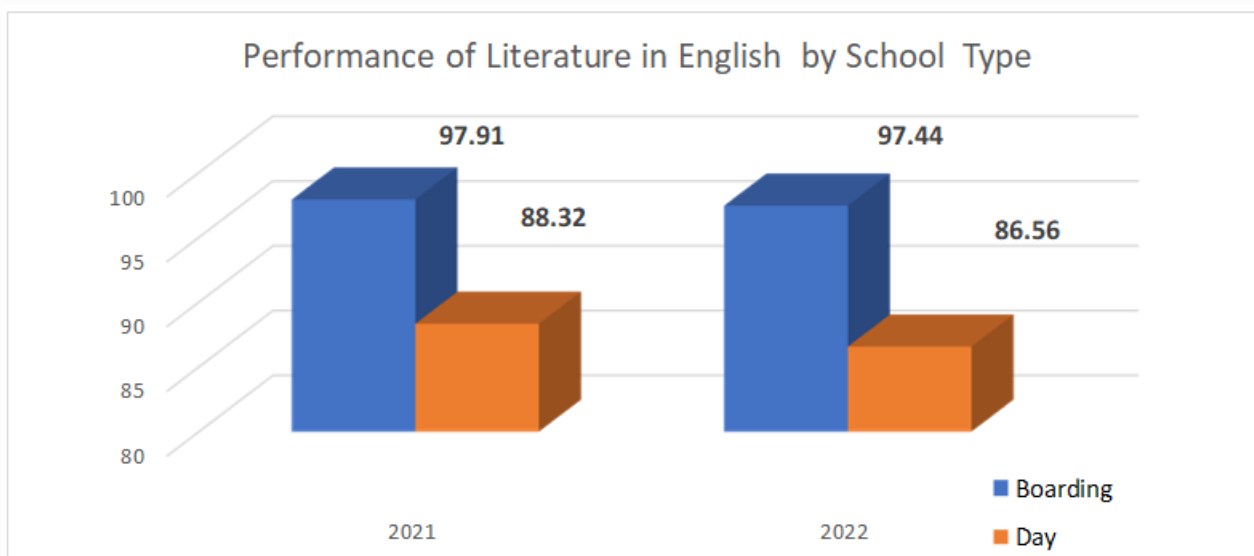


Figure 127: Pass rate of Literature in English in Boarding and Day schools

Figure 127 shows that in 2021 students in boarding schools performed better in Literature in English subject with a pass rate of 97.91% compared to 88.32% in day schools. Similarly, in 2022 students in boarding schools had a pass rate of 97.44% while those in Day schools had 86.56%. This suggests that there is a consistent trend in pass rate in Literature in English subject among students in boarding schools compared to those in day schools. However, there could be several factors that contributed to this trend, including differences in teaching methods, resources, and support systems.

3.3. 39 Pass rate and performance in S.6 French national exam

The results of students' performance in French national exam were analysed with focus on gender, school ownership and type of school (boarding/day). The figure below presents the pass rates in general and by gender.

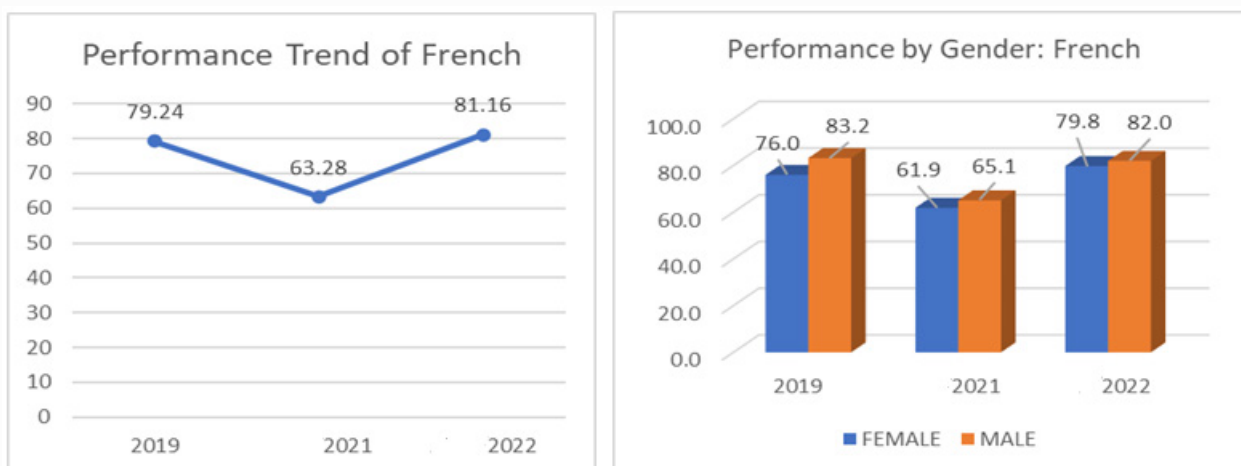


Figure 128: General pass rate in French and pass rate by gender

Based on the data provided in Figure 128, the pass rate in the French subject for S6 students in 2019 was 79.24%, but in 2021, it slackened to 63.28% and in 2022 it rose to 81.16%. Desegregated by gender, in 2019, the pass rate of male students was 83.2% and female it was 76.0%. This suggests that male students performed better than female students. However, in 2021, both male and female students had lower pass rate than in 2019. Male students had an average score of 65.1%, while female students had an average score of 61.9%. This suggests that both male and female students struggled with French during this year, possibly due to the impact of the COVID-19 pandemic on education. Finally, in 2022, both male and female students had higher pass rate than in the previous year. The pass rate among male students was 82.5% and for female it stood at 79.8%. This suggests that both male and female students improved their performance in French, although the pass rate for male students was slightly higher than female students.

3.3.40 Average score and Variation Coefficient and Standard Deviation in French

Table 29 portrays the average scores, standard deviation and variation coefficient of scores in Literature in French for three school years (2019, 2021 and 2022).

Table 29: Average score and Variation Coefficient and Standard Deviation in French

	2019	2021	2022
Mean	17.64	13.66	24.91
SD	8.34	9.02	12.16
VC	47.25	66.05	48.83
N	4,953	4,423	3,981

From Table 29, it is clear that the mean score in French significantly increased from 17.64 in 2019 to 24.91 in 2022 which indicates an improvement in performance. The standard deviation and variation coefficient for 2019 and 2021 were low, that

is, 8.34 and 9.02 respectively. This means that scores were clustered around the mean. However, in 2022, the SD was high despite the improvement in performance. The implication is that there was high variability in the scores, with some students performing exceptionally well while others perform poorly. Overall, the increase in the mean scores in French implied improvement in performance, but with increase in variability.

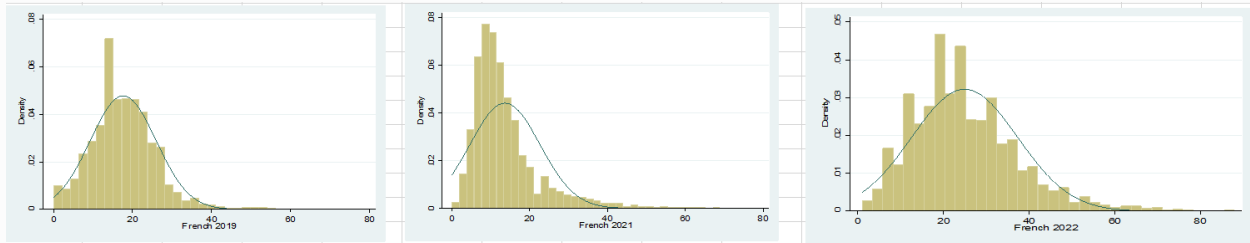


Figure 129: Distribution of Scores in French

Figure 129 shows some variations in distribution of scores on normal curves. In 2019 and 2021, the curves are asymmetrical and right-skewed with a bigger proportion of scores clustering on the left below the mean scores (17.64 & 13.66) and some few at the upper and lower limits. In 2022, the curve appears to be somewhat symmetrical with scores spread on both sides of the curve, but with variations from the mean score (24.91). Overall, this data suggests that the performance of students in French subject for advanced level general education (S6) improved in 2022, although many of students still scored relatively low in all three years.

3.3.41 Pass rate in French by School Ownership

Students' results in French national examination were analysed according to type of school ownership (Public, government aided and private). The figure below presents findings of the analysis.

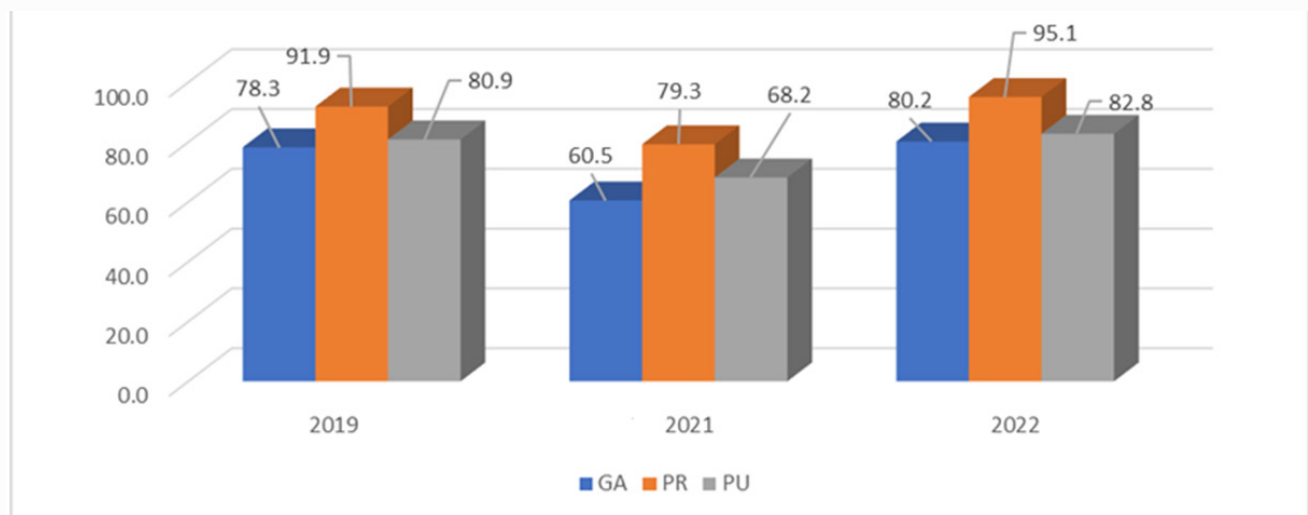


Figure 130: Pass rate in French by School Ownership

Figure 130 shows the average scores in French subject for different types of school ownership in the three different years (2019, 2021, and 2022). In 2019, private schools (PR) schools had the highest pass rate (91.9%), followed by public schools (PU) with a pass rate of 80.9%, and then government aided schools with 78.3%. This suggests that students in private schools performed relatively better than in public and government-aided schools. The trend of pass rate was similar in 2021, but relatively low compared to 2019. However, in 2022, the pass rates increased and were higher than in 2019 and 2021. The highest pass rate was in private schools (95.1%), followed government-aided (80.2%), and Public (82.8%). This suggests that there was an improvement in the performance of students in all types of school ownership, but private schools continued to have the highest pass rate. Overall, the data suggests that students in private schools generally perform better on average than students in public and government-aided schools in French subject, although there are fluctuations in performance over time.

3.3.42: Pass rate in French by School Boarding Type

Like other subjects, students pass rate in French were analysed by type of school (boarding and day). Figure 131 provides findings of the analysis.

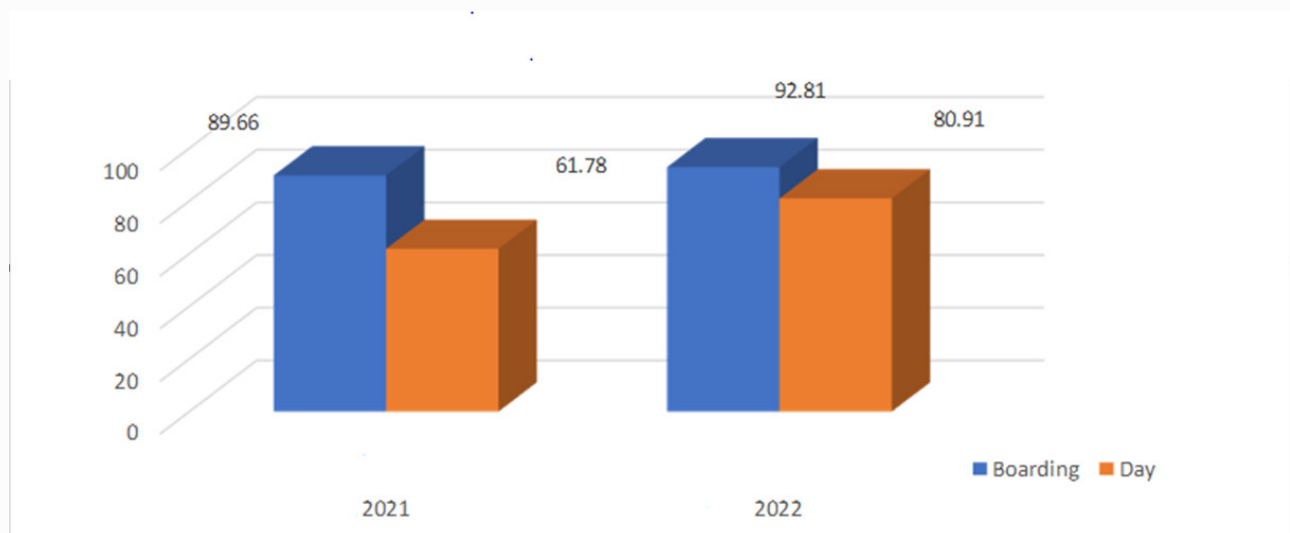


Figure 131: Pass rate in French by School Boarding Type

In 2021, boarding schools had a significantly higher pass rate (89.66%) than Day (61.78%). Similarly, in 2022, the pass rate in boarding was relatively high (92.81%) compared to day (80.91%). This data suggests that Boarding schools may have better educational facilities, resources, or teaching quality that are conducive to better performance in French subject. Alternatively, the data may suggest that students in Boarding schools have more opportunities to practice and use French language in their daily lives than students in Day schools. It is worth noting that this data only provides a snapshot of performance in French subject and does not necessarily reflect the overall quality of education or student outcomes in Boarding and Day schools. Other factors such as student motivation, teacher quality, and socio-economic status may also influence academic performance.

3.3. 43 Pass rate and performance in S.6 Kiswahili National Exam

The Kiswahili national exam results for senior six students were analysed taking into account gender, school ownership and type of school (boarding/day). Figure 132 below presents the pass rates in general and by gender.

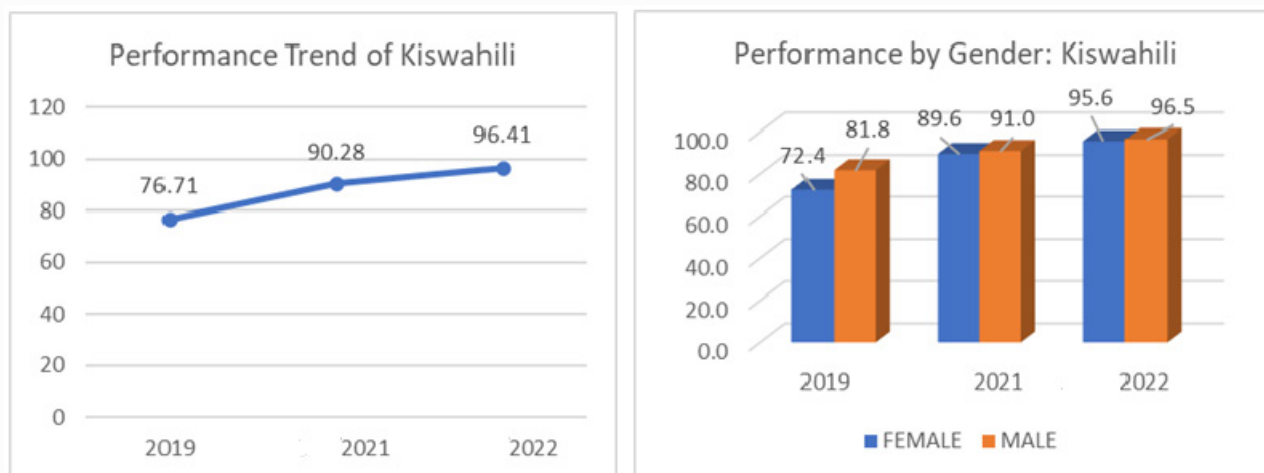


Figure 132: Pass rate trend in Kiswahili and pass rate by gender

Figure 132 shows a general progressive increase in pass in Kiswahili over the past three academic years. In 2019, the pass rate was 76.71%, but significantly rose to 90.28% in 2021 and to 96.41% in 2022. This trend indicates that students are making progress and becoming more proficient in Kiswahili. With respect to gender, the trend of increase in pass rate was similar, but it was relatively high among male students compared to female. Overall, while there is still a gender gap in Kiswahili performance, the data suggests that this gap is narrowing over time. More research would be needed to determine the factors driving this gap and the most effective strategies for addressing it.

3.3.44 Average score, SD and CV of scores in S.6 Kiswahili exam

Table 30 presents the average scores, standard deviation and variation coefficient of scores in Kiswahili for three school years (2019, 2021 and 2022).

Table 30: Average score and Variation Coefficient and Standard Deviation in Kiswahili

	2019	2021	2022
Mean	37.90	41.12	50.95
SD	18.12	17.68	19.39
VC	47.81	43.01	38.05
N	5,057	4,690	4,479

As indicated in the table above, the performance of students in Kiswahili in 2019 was relatively low compared to 2021 and 2022. The mean increased significantly

from 37.90 in 2019 to 41.12 in 201 and to 50.95 in 2022. This indicates an improvement in performance. The SD ranged from 17.68 to 19.39. This suggests that there was a significant change in the variability of scores over the years. The VC for Kiswahili has decreased from 47.81 in 2019 to 38.05 in 2022. This suggests an increase in consistency in performance. Overall, the data suggests that there was an improvement in Kiswahili performance with low variations in scores especially in 2022.

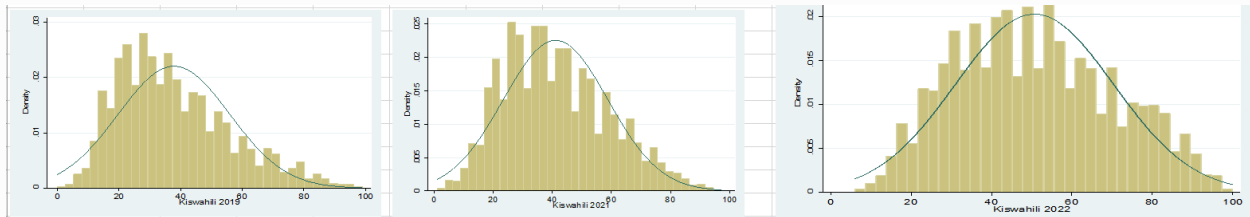


Figure 133: Distribution of Scores in Kiswahili Subject

The data presented in Figure 133 shows the distribution of scores in the Kiswahili subject over three academic years. In 2019, the distribution of scores in Kiswahili was largely left skewed with some few scores spread to the right tail of the normal distribution curve, which means that majority of the scores were below the mean score (37.9). However, in 2021 and 2022, the scores were somehow evenly distributed, but with some at extremes. Overall, the data presented in Figure 133 suggests that the distribution of scores in Kiswahili has changed especially in 2021 and 2022 with scores becoming more concentrated in the middle range.

3.3.45 Pass rate in S.6 Kiswahili by School Ownership

Students' pass rate in Kiswahili national examination were analyzed according to type of school ownership as depicted in Figure 134.

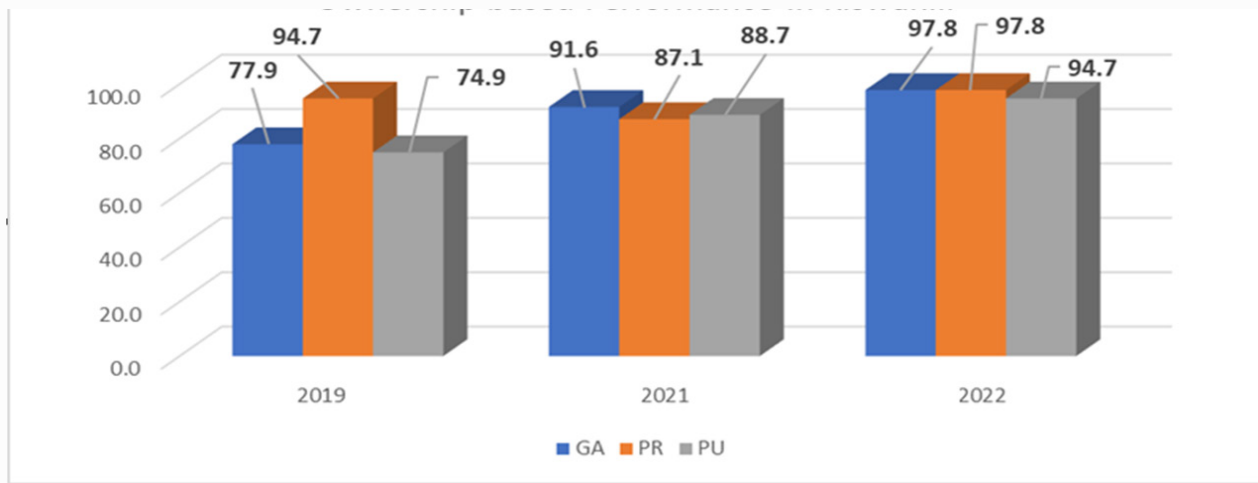


Figure 134: Pass rate in Kiswahili by School Ownership

Based on the data provided in Figure 134, it is clear that government aided schools consistently had the highest pass rate in 2021 and 2022 and in 2019, private schools came on top. There was a considerable increase in pass rate in 2021 and 2022 compared to 2019. Overall, all the types of school ownership made significant

improvement in pass rate in Kiswahili over the three years, with the GA and PR schools consistently performing relatively higher than public at a high level. The PU schools has made the most significant improvement, but still lagged behind.

3.3.46 Pass rate in Kiswahili by School Type

During the analysis of advanced level national exam results, the type of school (boarding and day) was considered. Figure 135 shows detail of pass rate in Kiswahili by each type of school.

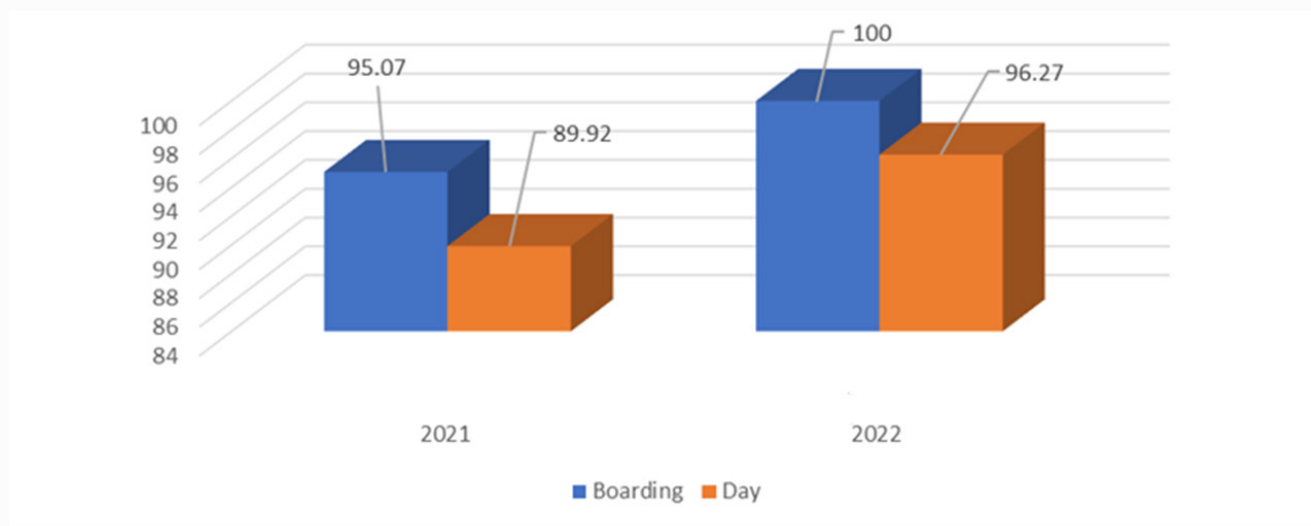


Figure 135: Pass rate in Kiswahili by School Type

The data provided in Figure 135 shows that the pass rate in both Boarding Schools and Day Schools performed was generally high for the two years. However, there was a difference between the two years. In the 2021 the pass rate in Boarding Schools was 95.07% while in Day it was 89.92%. The pass rate in 2022 was much higher than in 2021 with 100% in Boarding Schools and 96.27% in day. These results suggest that students in Boarding Schools consistently outperformed their counterparts in Day Schools in the two years. It's difficult to pinpoint the exact reasons for this difference, but it's possible that the learning environment provided in Boarding Schools may contribute to the higher performance of their students. Additionally, students in Boarding Schools may have more access to resources such as libraries, study groups, and tutors, which could help them to achieve higher scores.

3.3.47 Pass rate and performance in S.6 Kinyarwanda national exam

The Kinyarwanda national exam results for senior six students were analysed taking into account gender, school ownership and type of school (boarding/day). Figure 136 below presents the pass rates in general and by gender.

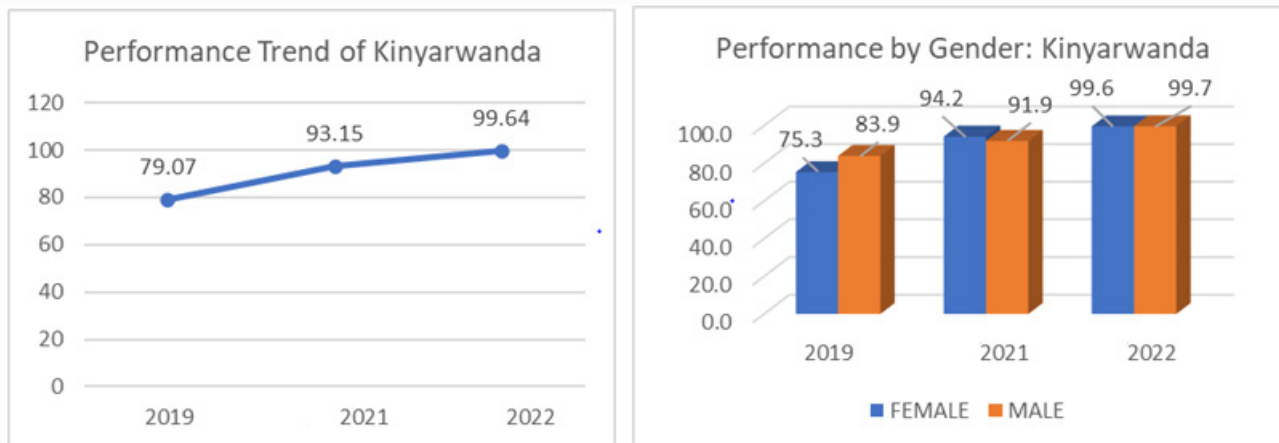


Figure 136: Pass rate trend in Kinyarwanda and pass rate by gender

According to the above figure, in 2019, the pass rate was 79.09%, and increased to 93.15% in 2021 and then to 99.64% in 2022. This trend indicates that students are becoming more proficient in the subject over time and that the quality of teaching and learning is improving. The significant increase in pass rate from 2021 to 2022. In relation gender in 2019, females had a lower pass rate in Kinyarwanda compared to males (75.3% male vs. 83.9% female). However, in 2021, females improved significantly while males showed a smaller improvement. In 2021, females had a higher pass rate than males (94.2% vs. 91.9%), and in 2022, both male and female performed better, with females having a slightly higher pass than female (99.6% vs. 99.7%). Overall, it seems that there has been a trend of improvement in Kinyarwanda performance for both male and female, but there was a n improvement in performance among females resulting in a narrow gender gap in pass rate.

3.3.48 Average score.SD and CV of scores in Kinyarwanda

Table 31 presents the average scores, standard deviation and variation coefficient of scores in Kinyarwanda for three school years (2019, 2021 and 2022).

Table 31: Average score, SD & CV of scores in in Kinyarwanda

	2019	2021	2022
Mean	51.35	48.80	59.85
SD	12.88	12.85	13.49
VC	25.09	26.33	22.54
N	9,355	8,726	8,250

The table 31 shows the average score, standard deviation, variation coefficient, and the number of candidates in Kinyarwanda in the years 2019, 2021, and 2022. The mean scores varied with a decrease from 51.35 in 2019 to 48.80 in 2021, followed by an increase to 59.85 in 2022. This suggests some variation in the performance of candidates over the years. The SD for Kinyarwanda has remained relatively stable over time, ranging from 12.85 to 13.49. This suggests that there has not been a significant change in the variability of Kinyarwanda performance among the candidates over the years. The VC for Kinyarwanda has fluctuated over time, ranging from 22.54 to 26.33. This indicates that the relative variability of Kinyarwanda performance has also fluctuated over time. Finally, the number of participants has decreased over time, with 9,355 candidates in 2019, 8,726 participants in 2021, and 8,250 candidates in 2022.

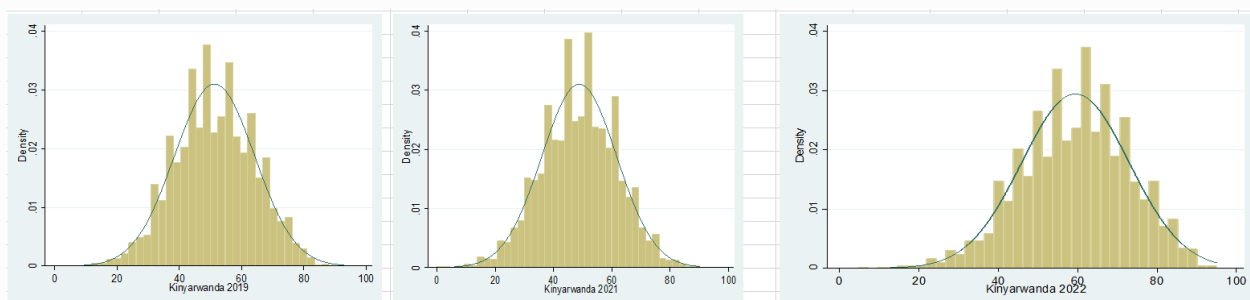


Figure 137: Distribution of Scores in S6 Kinyarwanda Subject

As indicated in Figure 137, the scores in Kinyarwanda in 2019, were relatively evenly distributed around the mean score (51.31), with some scores at extremes of the normal curve. The pattern of distribution was similar in 2021 and 2022 with less variability in the scores from the mean scores. This suggest that the scores in Kinyarwanda subject were consistent across the three years.

3.3.49 Pass rate of Kinyarwanda by School Ownership

The figure below provides detail of students' pass rate in Kinyarwanda by type of school ownership.

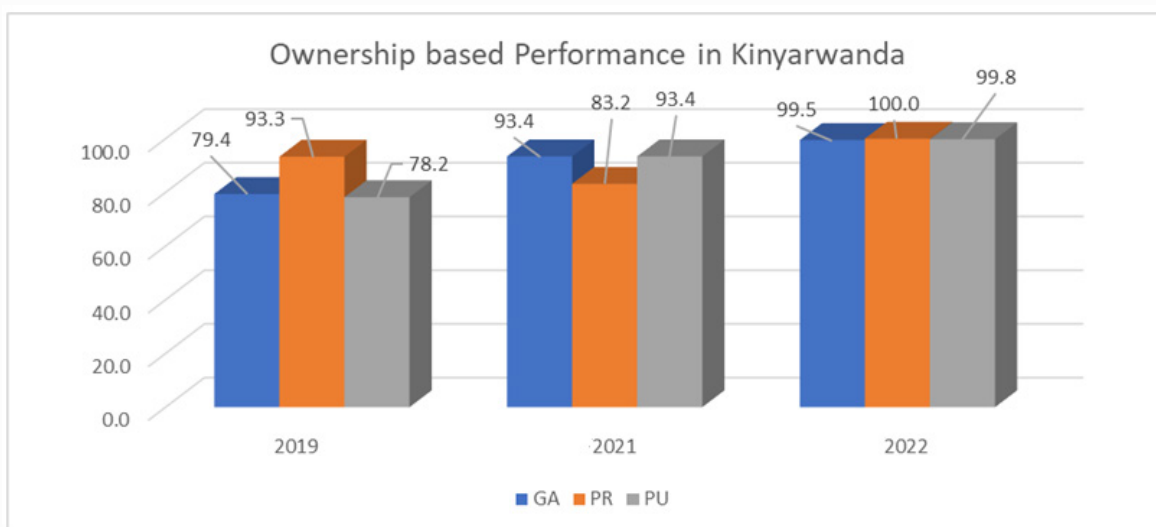


Figure 138: Pass rate of Kinyarwanda by School Ownership

Figure 138 presents the percentages of students who passed Kinyarwanda language according to type of school ownership over the three years (2019, 2021, and 2022). In 2019, the percentage of student who passed Kinyarwanda in Government Aided schools was 79.4%. Private schools had the highest pass rate (93.3%) and Public had the lowest (78.2%). In 2021, there was an increase in pass rate especially in government aided schools where it increased from 79.4% in 2019 to 93.4% in 2021. In private schools, the pass rate slightly decreased from 93.3% to 83.2%, but in public it increased from 78.2% in 2019 to 93.4% in 2021. In 2022, all three categories had high pass rates 99.5%, 100.0%, and 99.8% for GA, PR, and PU schools respectively.

3.3.50 Pass rate of Kinyarwanda in Boarding and Day schools

Figure 139 presents the pass rate of S.6 students in Kinyarwanda by type of school, that is, boarding and day.

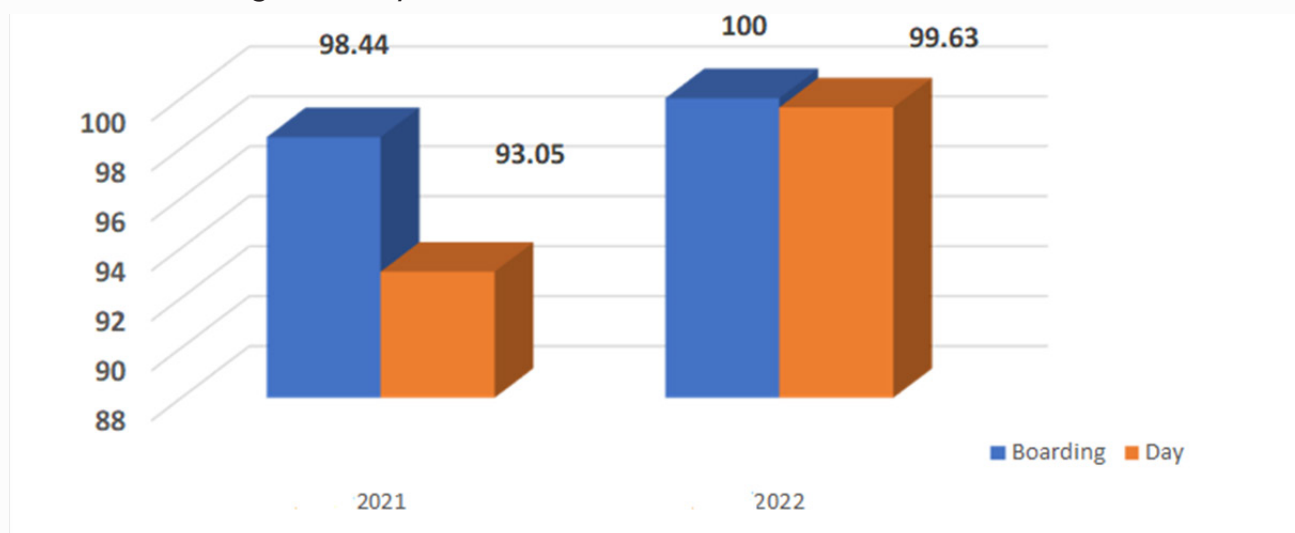


Figure 139: Pass rate in Kinyarwanda in Boarding and Day Schools

As the figure above shows, students in both Boarding Schools and Day Schools performed very well in Kinyarwanda in the two years as evidenced by the pass rates. However, the pass rate in Boarding Schools was slightly higher than in Day. It's difficult to know the reasons for this difference in performance, as there are many factors that can influence student achievement in school. Overall, the data suggests that students in both boarding and day schools performed well in Kinyarwanda and that the difference in performance between the two groups was minor.

3.3.51 Pass rate and performance in general studies and communication skills

The General Studies and Communication Skills national exam results for senior six students were analysed taking into account gender, school ownership and type of school (boarding/day). Figure 140 below presents the pass rates in general and by gender.

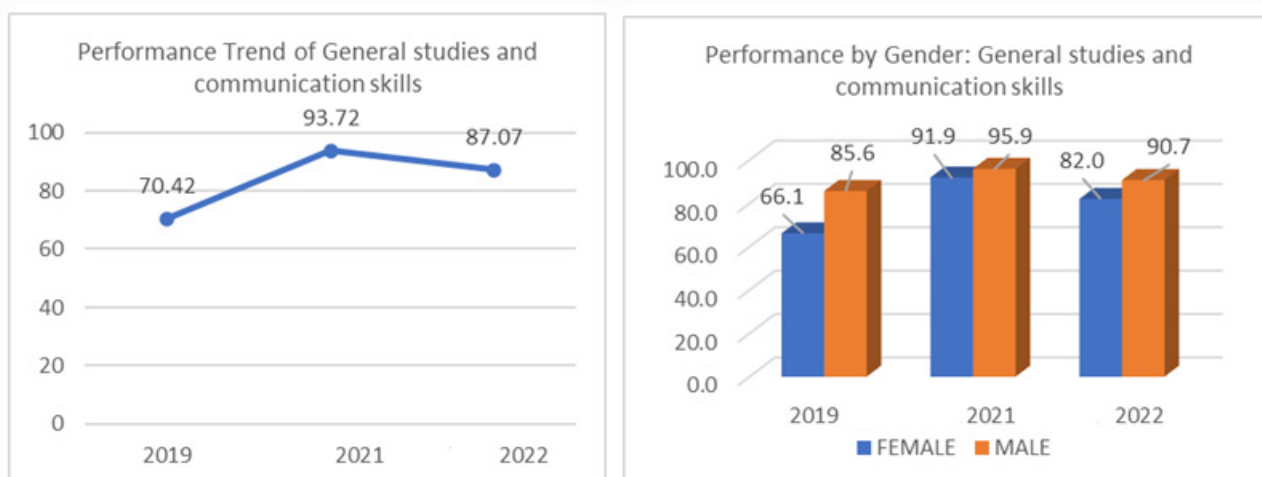


Figure 140: Pass rate in General studies and communication skills and Pass rate by gender

Figure 140 shows general pass rate trend in General Studies and Communication Skills subject among S6 students over three years: 2019, 2021, and 2022. In 2019, the pass rate was 70.42%, but increased to 93.72% in 2021 and dropped to 87.07% in 2022. Disaggregated by gender, male students had a higher pass rate in 2019 compared to their female counterparts and it was the same case in 2021 and 2022. Nevertheless, both male and female students improved their performance in General Studies and Communication Skills.

3.3.52 Average score, SD & CV of scores in General Studies and Communication Skills

Table 32 presents the average score, standard deviation (SD), variation coefficient (VC), and the number of students (N) for General Studies and Communication Skills for three 2019, 2021, and 2022.

Table 32: Average score, SD & CV

	2019	2021	2022
Mean	62.83	58.72	61.05
SD	16.34	17.08	17.76
VC	26.01	29.09	29.09
N	46,938	47,416	46,019

The mean score for the subject was 62.83 in 2019, and decreased slightly to 58.72 in 2021, but increased slightly to 61.05 in 2022. Generally, the performance of students in General Studies and Communication Skills was relatively better than the core subject combinations at advanced level. The SD & CV show that the scores were concentrated around the mean scores with less variability.

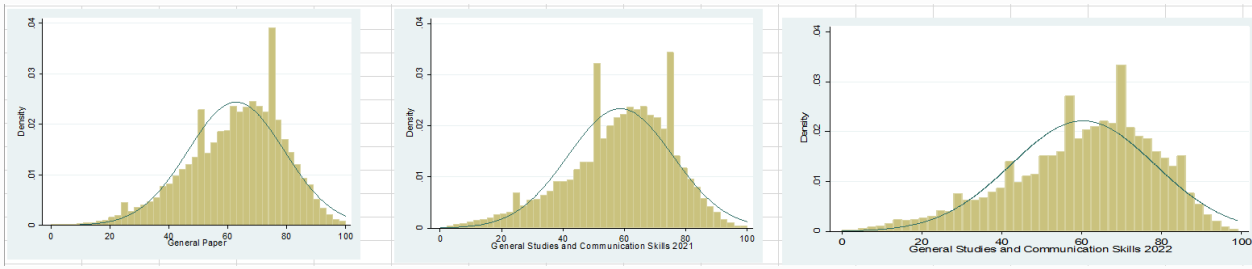


Figure 141: Distribution of Scores in General Studies and Communication Skills

Figure 141 shows that for all the three years, the curves are generally left ward skewed with most scores concentrated on the right of curves. This indicates that more scores were distributed above then mean scores but with some few on the extreme tails of the curves.

3.3.53 Pass rate in General Studies and Communication Skills by School Ownership

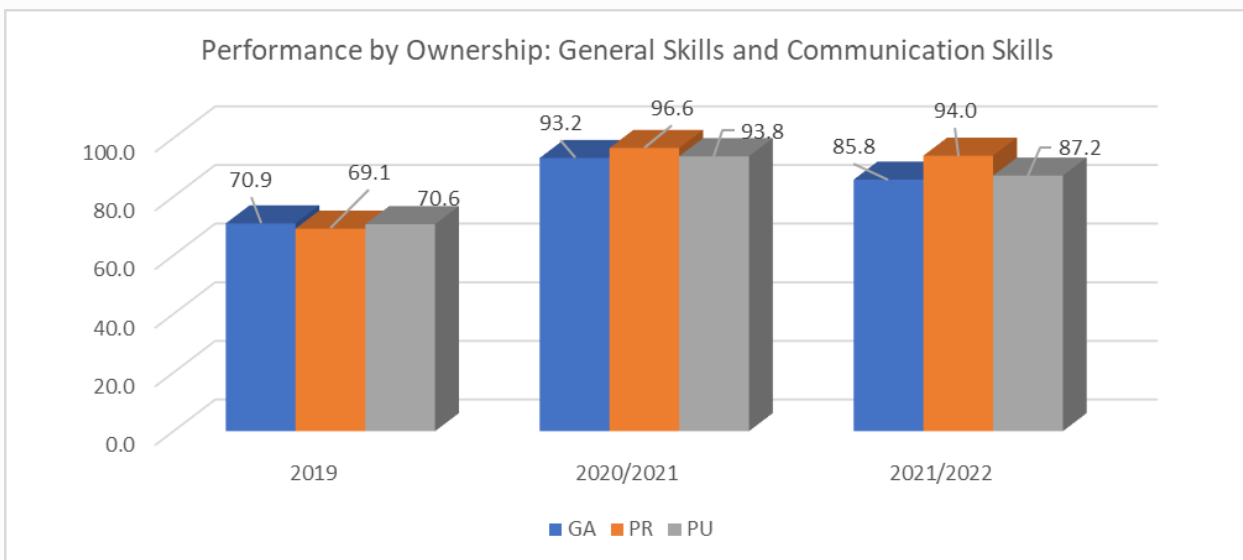


Figure 142: Pass rate in General Studies and Communication Skills by School Ownership

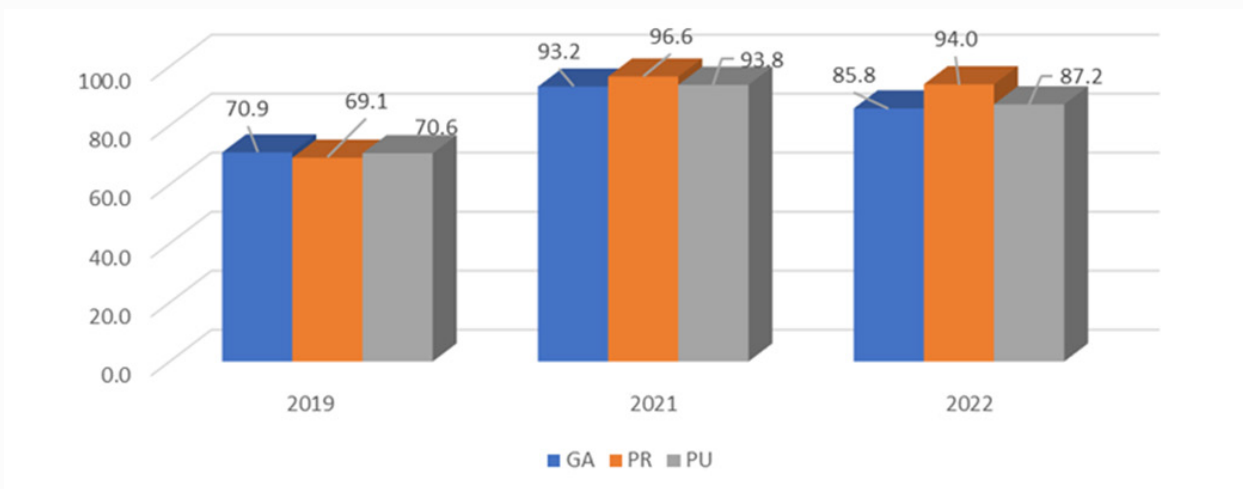


Figure 143: Pass rate in General Studies and Communication Skills by type of school ownership

Figure 143 presents percentages of students who passed General Studies and Communication Skills by School Ownership (Government Aided, Private, and public schools) over three consecutive years: 2019, 2021, and 2022. The figure shows that the highest percentage of students who passed General Studies and Communication Skills in 2019 were from the Government Aided schools with a percentage of 70.9%, followed by public schools with 70.6%, and Private schools with 69.1%. The academic year 2021 registered a significant increase in the percentage of students who passed General Studies and Communication Skills across all the school ownership categories. The highest score went to private schools with a percentage of 96.6%, followed by Government Aided schools with 93.2%, and public schools with 93.8%. In 2022, the percentage decreased in all types of school ownership. The highest percentage was still in the Private schools with 94.0%, followed by Government Aided schools with 85.8%, and public schools with 87.2%. Overall, the students from all the school ownership categories improved their performance in General Studies and Communication Skills but the highest percentages was in Private schools.

3.3.54 Pass rate in General Studies and Communication Skills in Boarding and Day Schools

Students' results in national exam of General Studies and Communication Skills were analysed according to type of school and the figure below provides detail.

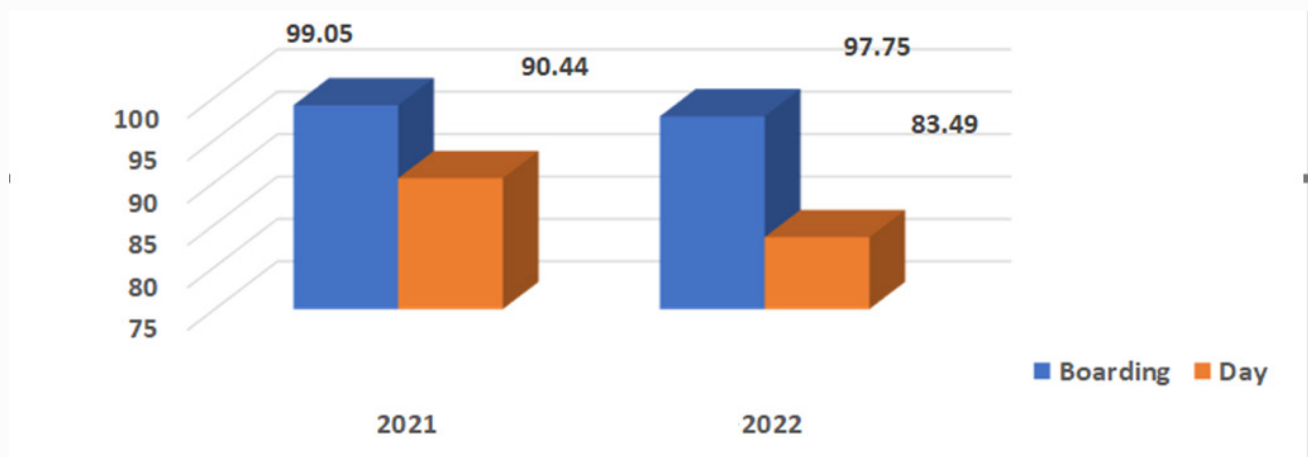


Figure 144: Pass rate in pass by type of school (Boarding and Day)

According to the above figure, in 2021, the pass rate in Boarding Schools (99.05%) was relatively higher than Day (90.44%) and it was the same case in 2022. This difference in performance could be attributed to several factors. Boarding Schools often provide a more structured and disciplined learning environment, which may lead to better academic performance. Additionally, students in Boarding schools normally have more access to resources such as libraries, study groups, and tutors. However, it's important to note that these results do not necessarily indicate that Boarding Schools are inherently better than Day Schools. There are

many factors that can influence students' performance, including the quality of teaching, students' motivation, and individual learning styles. It's also worth considering that students in Boarding Schools come from different socioeconomic backgrounds or have different levels of academic ability than students in Day Schools, which could affect their performance. Overall, while the data suggests that students in Boarding Schools tend to perform better in General Studies and Communication Skills than students in Day Schools, it's important to take a holistic view of student performance and consider all the factors that may be influencing it.

3.4. Analysis of TTCs national examination results for 2019, 2021 and 2022

This section presents results of analysis of national examinations for TTCs for 2019, 2021 and 2022. There were 18 subjects for which students' pass rates were analysed. Focus was on general pass rates, pass rate by gender as well as pass rates per subject. The subjects are: Foundations of education, Foundations of Early Childhood education, Mathematics, French, social and religious studies, English, Creative performance and Physical education, Kinyarwanda, Integrated Science, Numeracy & Mathematics, General science & Mathematics, Kiswahili, Entrepreneurship, and Teaching practice. Different from the previous years, in 2022 new subjects were examined and these include: Biology, Economics, Physics, Chemistry, Social and Religious Studies, Geography, History, Creative Performance, and teaching methods.

3.4.1 General pass rates in TTC national examinations

The table below presents the total number of TTC students who registered for national exams, the number students who sat for exam and those who passed in 2019, 2021 and 2022.

Table 33: General TTC Students' pass rates in 2019, 2021 and 2022

Year, Number & Percentage						
	2019	%	2021	%	2022	%
Number and percentage of students registered for exam	4251	100%	2,988	100%	2,907	100%
Number and percentage of students who sat for all exams	3,938	92.6%	2,988	100%	2,895	99.6%
Number and percentage of students who passed	3,869	98.2%	2,980	99.7%	2,892	99.9%

As presented in Table 33, in 2019, registered candidates were 4,251, but 3,938 (92.6%) students sat for all exams. In 2021 all candidates (2988) registered sat for national examinations but in 2022 the number reduced to 2895(99.6%). Overall, the number of students who registered for national examinations fell from 4251 in 2019 to 2907 in 2022.

In regard to pass rates despite the decreasing number of candidates from year to year, the pass rates consistently increased over the three years; 98.2%, 99.7% and 99.9% respectively. The highest pass rate (99.9%) was recorded in 2022. Accordingly, there is need to investigate the factors underlying the decreasing trend of students registering for national examinations in TTCs.

3.4.2 General Pass and Performance in Foundations of Education

Students' performance in Foundations of Education (FOE) is presented in form of pass rates over the three years and by gender as presented in figure 145.

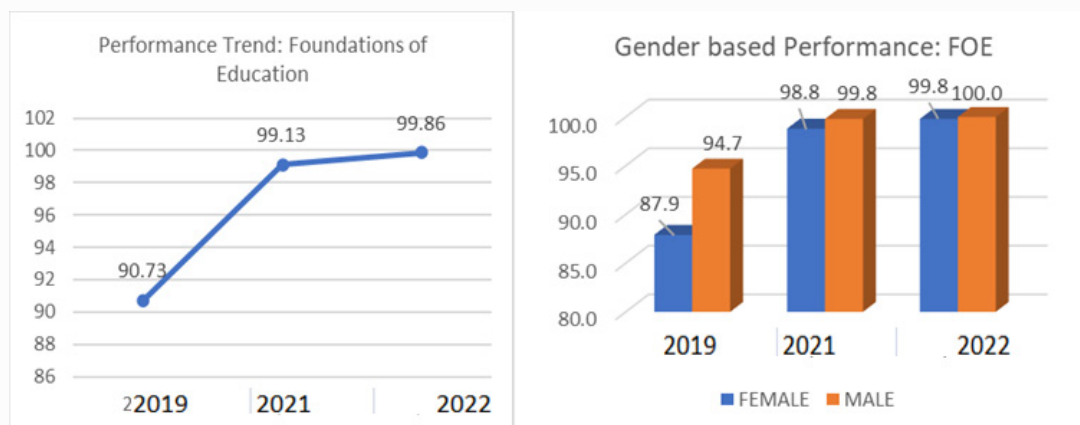


Figure 145: General Pass rate trend in FOE and pass rate by gender

Figure 145 shows a progressive trend in the students' pass rates in Foundations of Education over the three years 2019 (90.73%), 2021(99.13%), and 2022 (99.86%). This means that a considerable improvement as indicated by a higher percentage of students were able to meet the performance criteria in the mentioned years. Overall, these results indicate that there has been a significant improvement in the performance of TTC students in foundations of Education subject. Besides the general pass rates, gender aspect was also analysed whereby a progressive improvement over the years was observed among male and female students. For females pass rates improved from 87.9% in 2019; 98.8% in 2021; and 99.8% in 2022 while for males the trend was 94.7%, 99.8%, 100% respectively. By comparison, the pass rates for males in the three years under consideration outperformed those of females but with a narrowing gender disparity in pass rates as illustrated in Figure 145. Overall, the analysis reveals a considerable improvement in the pass rates of both male and female students in Foundation of Education subject. Students' performance in FOE can further be understood with reference to summary statistics including the average score, variation Coefficient and Standard Deviation as presented in Table 33.

Table 34: Summary statistics for performance in foundations of education

	2019	2021	2022
Mean	65.9	79.0	79.2
SD	17.4	10.9	9.6
VC	26.4	13.8	12.2
N	3,335	2,423	2,909

Table 34 shows a substantial improvement in mean score from 65.9 in 2019 to 79.0 in 2021 and to 79.2 in 2022. This implies that, on average, students performed better in this subject in the latter two years than in the first year. The standard deviation (SD) decreased from 17.4 in 2019 to 10.9 in 2021 and further to 9.6 in 2022. This shows that the scores were less spread out and more consistent in the two years. This denotes an improvement in the overall performance of students in Foundation of Education: In a nutshell, there was improvement in the students' performance in Foundations of Education subject over the three years, as indicated by an increase in the mean score, a decrease in the standard deviation and variation coefficient.

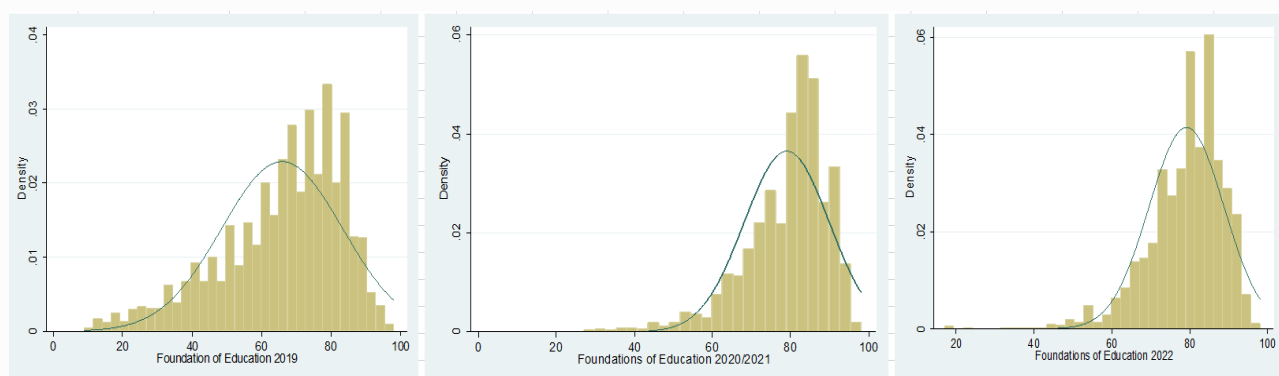


Figure 146: Distribution of Scores in Foundations of Education Subject

Looking at the curves in all three years, they are left skewed with most of the scores were concentrated on the right sides of the curves. This suggests that the majority of students' scores were clustered around the mean scores with few score on extreme sides. Overall, the data suggests that the performance of TTC students in Foundations of Education improved over the years, as indicated by rightward sleekness of the scores. Teachers interviewed attributed the progressive improvement in pass rates to changes in teaching methods, increased resources and support, and enhanced student engagement.

3.4.3 General Pass rate and performance in Foundations of Early Childhood Education

The pass rates for Foundations of Early childhood education analysed are for two years; 2019 and 2021. This is due to the fact that in 2022 the subject was no longer among the examinable subjects. The pass rates are presented in Figure 147.

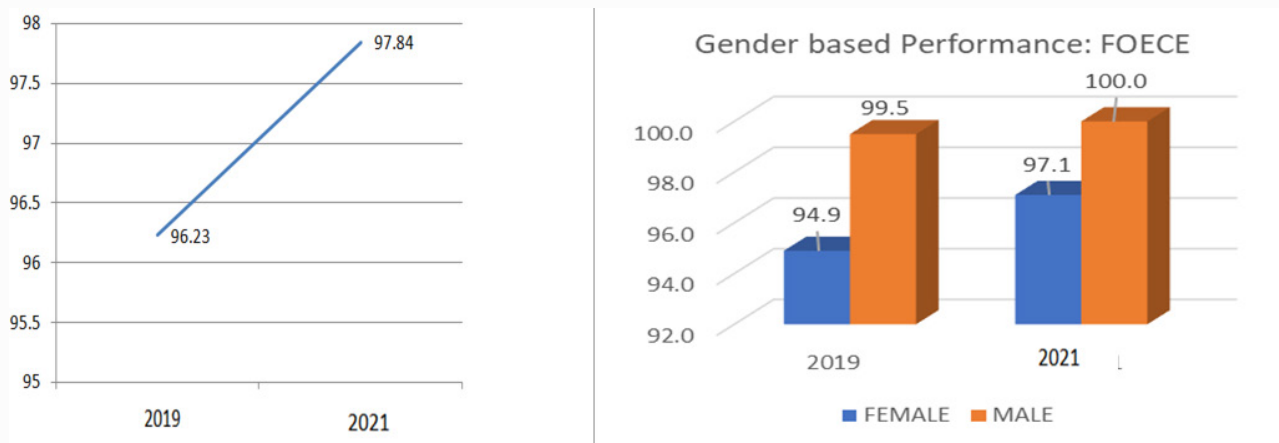


Figure 147: General pass rates and pass rates by gender in FOECE

The data provided in figure above shows a positive trend in the students' performance in Foundations of Early Childhood Education subject over the years 2019 and 2021. Specifically, the pass rates increased from 96.23% in 2019 to 97.84% in 2021. This indicates consistent excellent pass rates that should be sustained. Figure 147 also depicts improved pass rates for both male and female students in 2019 and 2021. In 2019, 94.9% of female students and 99.5% of male students passed the examination. In 2021, 97.1% of female students and 100% of male students passed the subject exams. Worth noting is that the pass rates improved with a decreasing gender disparity. It is important to continue monitoring and addressing any gender gaps in performance to ensure that both male and female students receive equal opportunities and support to succeed in their education. This could involve providing targeted interventions to support female students' learning, or addressing any potential biases in the teaching or assessment methods used during the course of teaching and learning.

Summary statistics

To clarify on students' performance in FOECE summary statistics comprising of: Mean score, variation coefficient (VC) and Standard Deviation (SD) are presented in the table below.

Table 35: Summary statistics for performance in foundations of education

Year:	2019	2021
Mean	67.7	69.8
SD	13.5	12.7
VC	19.9	18.3
N	663	556

Table 35 provides information on the mean score, standard deviation (SD), variation coefficient (VC), and number of students (N) for the FOECE subject in 2019 and in 2021 respectively. The mean score for the FOECE subject increased from 67.7 in 2019 to 69.8 in 2021. This implies an improvement in overall students' performance in the subject over the two years. The decreasing standard deviation (from 13.5 in 2019 to 12.7 in 2021) and the variation coefficient from 19.9 in 2019 to 18.3 in 2021 suggests a decrease in the variability of scores. Overall, the data suggests that students' performance in the FOECE subject improved over the two years, and that there was less variability in performance in 2021 than in 2019. It is important to continue monitoring performance in the subject and identifying areas for further improvement.

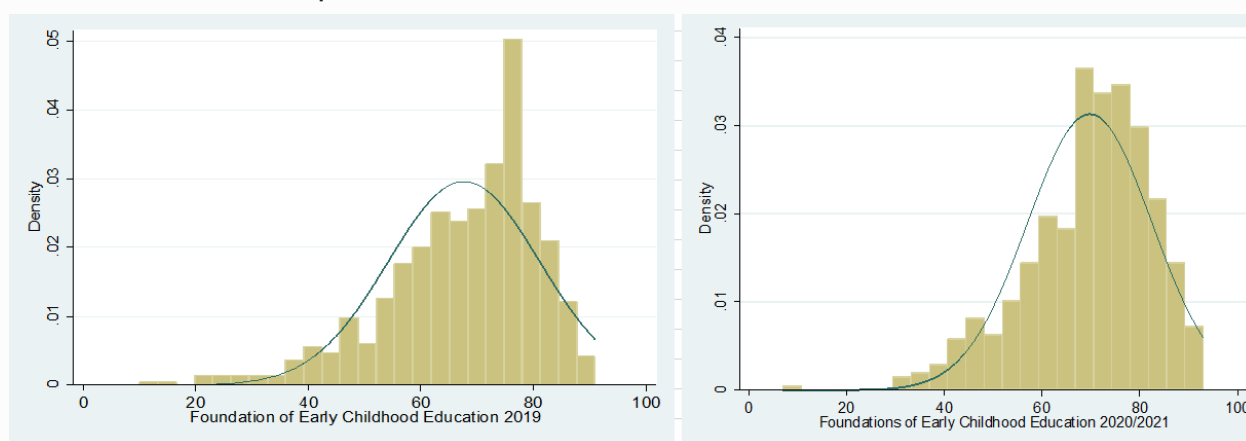


Figure 148: Distribution of Scores in FOECE

Figure 148 shows the distribution of scores in the Early Childhood Education subject for two school years, 2019 and 2021. Accordingly, the scores are concentrated around the mean scores (67.7 in 2019 and 69.8 in 2021) implying good performance and low variability as indicated by the standard deviation (13.5 in 2019, and 12.7 in 2021) that is much less than a third of the mean score. According to APA (2019), a standard deviation less than one third of the mean score is considered a low variation. However, despite the concentration of scores around the mean and low variability in both years, there were some scores in the upper tail and lower tail of the normal distribution curve.

3.4.4. General pass rate and Performance in TTC Mathematics national exam

The analysis of students' performance also put into consideration students' pass rates in mathematics in general and with a gender perspective as presented in figure below.

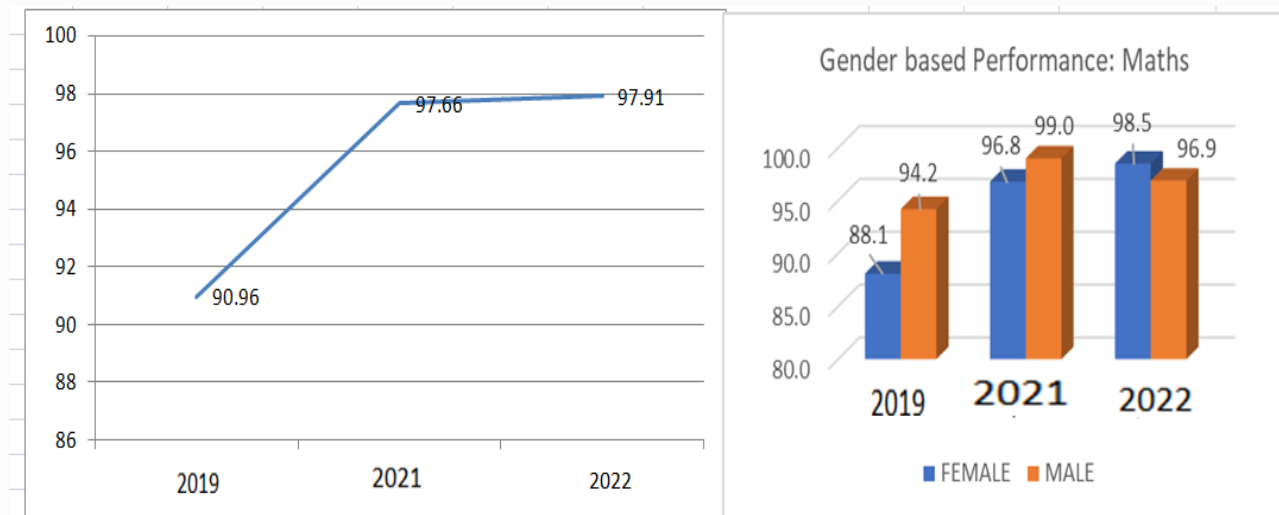


Figure 149: general pass rate in TTC Mathematics and pass rate by gender

Figure 149 shows the pass rate in Mathematics in TTCs 2019, 2021, and 2022. The pass rate in Mathematics in TTC increased from 90.96% in 2019 to 97.66% in 2021, and to 97.91% in 2022. This indicates a steady improvement in students' performance in Mathematics over those years. Even though the pass rates increased, there is still need to address factors that contribute to the failure of some students since the pass rate is not 100%.

In a gender perspective as illustrated in Figure 149 consistent good pass rates for both male and female students in 2019, 2021 and 2022. Generally, the trend of pass rates for females 88.1% in 2019, 96.8% in 2021, 98.5% in 2022 and that of males 94.2% in 2019, 99% in 2021, and 96.9% in 2022 is commendable. However, the pass rates for males in 2022 backslid to 96.9% from 99% in the previous year 2021. In addition, throughout the three years under consideration, gender disparity continued to manifest. It is important to continue monitoring and addressing any gender gaps in performance to ensure that both male and female students receive equal opportunities and support to succeed in their education.

Summary statistics

A summary statistic depicting students' performance in terms of: Mean score, variation coefficient (VC) and Standard Deviation (SD) as presented in table 36 to guide the analysis of students' performance in mathematics.

Table 36: Summary statistics for Mathematics

	2019	2021	2022
Mean	60.3	75.1	51.9
SD	14.9	15.6	17.5
VC	24.7	20.7	33.7
N	1,161	981	1,386

Table 36 shows the Mean, standard deviation, variation coefficient, and number of students (N) that sat for mathematics examinations in three school years: 2019, 2021, and 2022. The mean score in mathematics increased from 60.3 in 2019 to 75.1 in 2021, and then decreased to 51.9 in 2022. The standard deviation also increased over the three years, from 14.9 in 2019 to 15.6 in 2021, and then to 17.5 in 2022. The variation coefficient (VC), which is the ratio of the standard deviation to the mean expressed as a percentage, decreased from 24.7 in 2019 to 20.7 in 2021, and then increased to 33.7 in 2022. This suggests that the variability in mathematics scores increased in 2022. The number of students (N) was 1,161 in 2019, decreased to 981 in 2021, and then increased to 1,386 in 2022. Overall, the analysis shows that there have been changes in the mean, standard deviation, and variation coefficient of mathematics scores over the three school years indicating variations in student performance. Specifically, the standard deviation increased from 14.9 in 2019 to 17.5 in 2022 implying that there are students with very low scores and others with scores tending to 100% as further illustrated in the figure below.

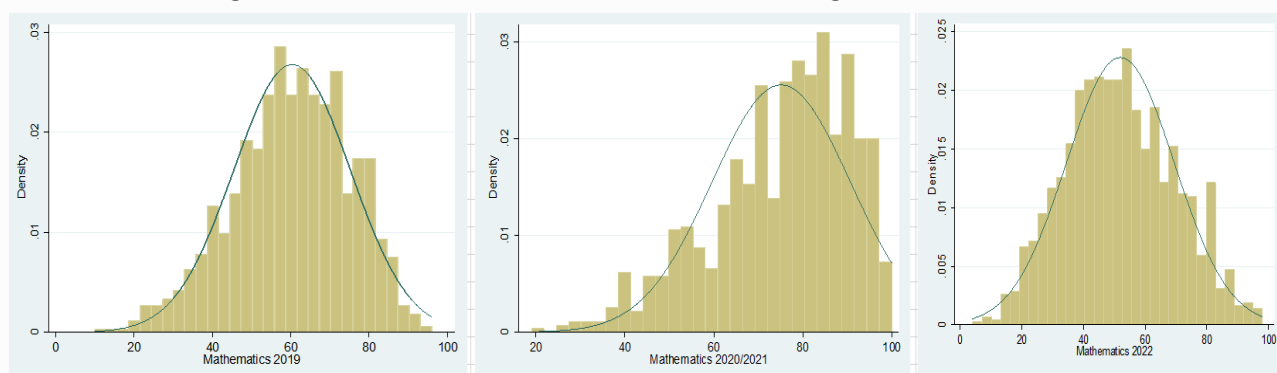


Figure 150: Distribution of Scores in Mathematics

Figure 150 shows that the distribution of scores in mathematics subject over three school years (2019, 2021, and 2022) was symmetrical in 2019 with the majority of students' scores were concentrated around the mean score with a few in the extremes. This suggests that the majority of students were consistent. Nonetheless, in 2021 the curve is skewed towards the left (asymmetrical) with majority of scores concentrated on the right. In 2022, the distribution of scores was somewhat symmetrical with scores evenly spread to both sides of the curve. Overall, the distribution of scores in mathematics subject over the three school years shows that there were changes in the performance levels of the students taking the exam.

3.4.5 General pass rate and Performance in TTC French national exam

The figure below presents the general pass rate trend for three years and pass rate disaggregated by gender.

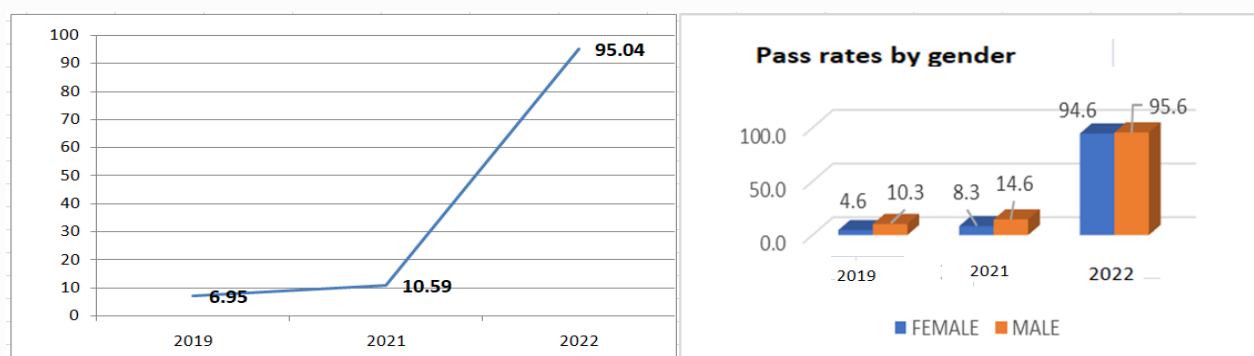


Figure 151: General pass rate trend in French and pass rate by gender

Figure 151 shows the performance trend in French subject for three school years: 2019, 2021, and 2022, as indicated by the respective pass rates. In 2019 and 2021 the pass rates were 6.95% and 10.95% respectively. Accordingly, very few students passed the French examination. In 2022 the pass rate drastically increased to 95.04%. The pass rate was very high, which indicates that almost all the students passed the exam.

In regard to pass rates disaggregated according to gender, in 2019, 2021, and 2022 the pass rates were 4.6%, 8.3%, 94.6% for female while for male it was 10.3%, 14.6%, and 95.6% respectively. The pass rates indicate that in 2019 and 2021 very few students passed the exam while in 2022 the reverse was true. There is a dire need to establish the factors that brought about the drastic improvement in student pass rates in French examination in 2022 compared to 2019 and 2021.

Summary statistics for performance in French

Summary statistics presented here indicate the Mean score, Variation Coefficient (VC) and Standard Deviation (SD) in French scores.

Table 37: Summary statistics for performance in French

	2019	2021	2022
Mean	16.4	21.5	42.4
SD	12.9	13.3	15.5
VC	78.5	62.0	36.7
N	3,308	2,424	686

Table 37 shows the Mean score, standard deviation (SD), variation coefficient (VC) and the number of students (N) for French subject examination in three school

years: 2019, 2021, and 2022. In 2019, the mean score was 16.4, which indicates that the performance was generally poor. The SD of 12.9 and CV of 78.5 imply that the scores were highly spread from a way from the mean. The trend of performance was similar in 2021 though the mean score increased to 21.5. In 2022, the mean score increased significantly to 42.4 indicating a substantial improvement in performance but there was a high variability in scores and the SD and CV are high.

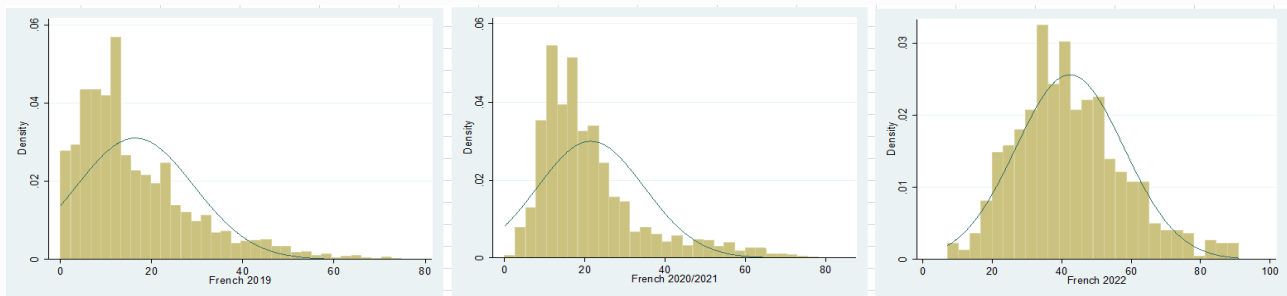


Figure 152: Distribution of Scores in French

As indicated in the figure above the distribution of scores in 2019 is skewed towards the left and the curve is rightward skewed (asymmetrical). This means that majority of the scores are spread below the mean score, with a few above the mean. In 2021, the scores were concentrated between 5 and 40, with a few scores below 5 and a few others above 40. In 2022, the curve is also asymmetrical with concentrated on the left indicating that many scores were below the mean score although it increased from 16.4 in 2019 to 21.5. The last curve (2022) is symmetrical, with scores evenly distributed.

3.4.6. General Performance in Social and Religious Studies (SRS)

The general pass rate of TTC students in Social and Religious Studies (SRS) subject and pass rate by gender are presented in the figure below.

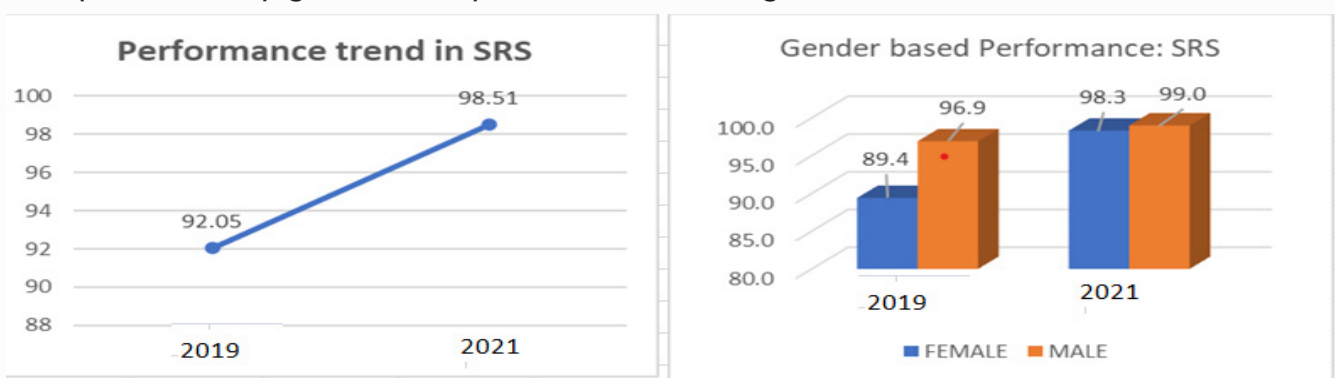


Figure 153: General pass rate in SRS and pass rate by gender

The data presented in the above figure indicates a significant improvement in pass rate from 92.05% in 2019 to 98.51% in 2021. Interviews with some teachers revealed that a number of factors might have contributed to this improvement. One of them could be an improvement in teaching quality, where teachers might have adopted new teaching methods or materials that helped the students to

understand the subject better. Another possible factor could be an increase in student motivation, where students might have been more interested and engaged in learning the subject, possibly due to the relevance of the subject matter to their personal beliefs or values. Looking at the pass in Social and Religious Studies from the gender perspective, the pass rate of male students was quite higher than female, but there was a noticeable increase in pass rate for both sexes.

Summary statistics for performance in SRS

Summary statistics presented here indicate the Mean score, Variation Coefficient (VC) and Standard Deviation (SD) in SRS scores.

Table 38: Average score, SD and VC in SRS

	2019	2021
Mean	64.1	70.2
SD	16.2	12.2
VC	25.3	17.5
N	1,634	1,276

Table 38 shows the average score, standard deviation, variation coefficient, and the number of students (N) in the Social and Religious Studies (SRS) subject for 2019 and 2021. The average score increased from 64.1 in 2019 to 70.2 in 2021. This signifies an improvement in the overall performance of the students in the SRS subject. The increase in average score can be attributed to a number of factors, such as changes in the curriculum, improved teaching methods, and increased motivation of the students.

The standard deviation (SD) decreased from 16.2 in 2019 to 12.2 in 2021, and this indicates a decrease in the dispersion of scores. This implies that the performance of the students in SRS subject has become more consistent over the years, possibly due to the aforementioned factors that contributed to the improvement in average score. The variation coefficient (VC) also decreased from 25.3 in 2019 to 17.5 in 2021, which indicates a decrease in the relative variation of scores. This suggests that the improvement in average score was not driven by a few exceptional students but rather by a more even distribution of scores across the student population.

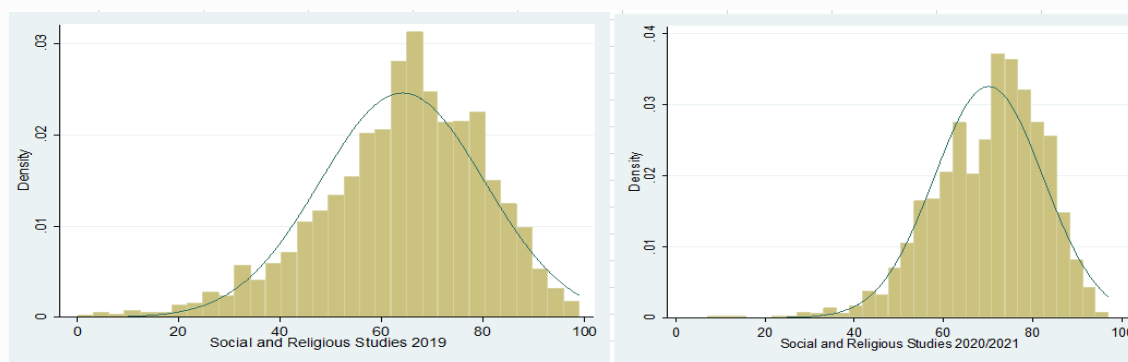


Figure 154: Distribution of Scores in SRS

Figure 154 shows the distribution of scores in the Social and Religious Studies (SRS) subject for two schoolyears is asymmetrical, with majority scores concentrated on the right and the curves skewed leftward. This suggests that there were many high scores and the variability was low. However, there were some few scores that were very low as indicated by the skewness of the curve. The distribution of scores in the SRS subject in both years implies that there was an improvement in the performance of students, with more students scoring higher than the average and fewer students scoring below.

3.4.7 General pass rate and Performance in TTC English national exam

The figure below illustrates the trend of TTC students' pass rate in English national exam for three years, that is, 2019, 2021 and 2022.

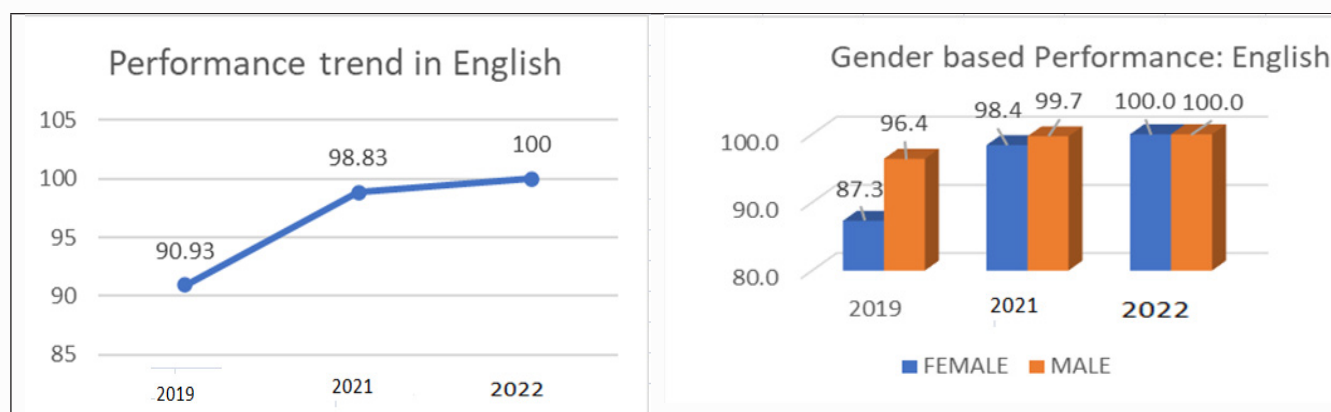


Figure 155: General pass trend in English and pass rate by gender

According to the above figure, the pass rate increased significantly from 90.93% in 2019 to 98.83% in 2021 and to 100% in 2022. The high increase in the pass rate implies that there was improvement in the teaching and learning methods. This according to some teachers interviewed could be attributed to various factors, such as better teaching materials, improved teacher training. With the exception of 2019 where the pass rate of male students was relatively high compared to female, in 201 and 2022, the pass rate for male and female students was more or less the same. Overall, the trend in the English subject pass rate in TTC indicates that there was significant improvement in the ' performance for both male and

females over the past three years. The equal pass rates in 2022 suggest that there was no significant gender disparity in English subject performance in TTC, which is a positive step taken in English subject.

Summary statistics for performance in TTC English national examination

Summary statistics indicating the Mean score, Variation Coefficient (VC) and Standard Deviation (SD) in English scores in the table below:

Table 39: Average score, SD and CV in English Subject

	2019	2021	2022
Mean	60.3	66.0	68.3
SD	14.2	9.9	10.7
VC	23.5	15.0	15.7
N	3,999	2,980	2,909

Table 39 shows the mean score, standard deviation (SD), variation coefficient (VC), and number of students (N) in English national examination school years: 2019, 2021, and 2022. Accordingly, the mean score for English subject increased from 60.3 in 2019 to 66.0 in 2021 and rose further to 68.3 in 2022. This increase indicates that students' performance in English improved over the three years. Moreover, the standard deviation (SD) decreased from 14.2 in 2019 to 9.9 in 2021. The Variation coefficient (VC) decreased from 23.5 in 2019 to 15.0 in 2021. In 2022, the SD and VC increased slightly to 10.7 and 15.7 respectively. The decrease in the SD and VC in 2019 and 2021 suggests that there was less variability in students' scores, which implies progressive improvement in student performance in English. The number of students (N) who took English subject examination decreased from 3,999 in 2019 to 2,980 in 2021, and further to 2,909 in 2022.

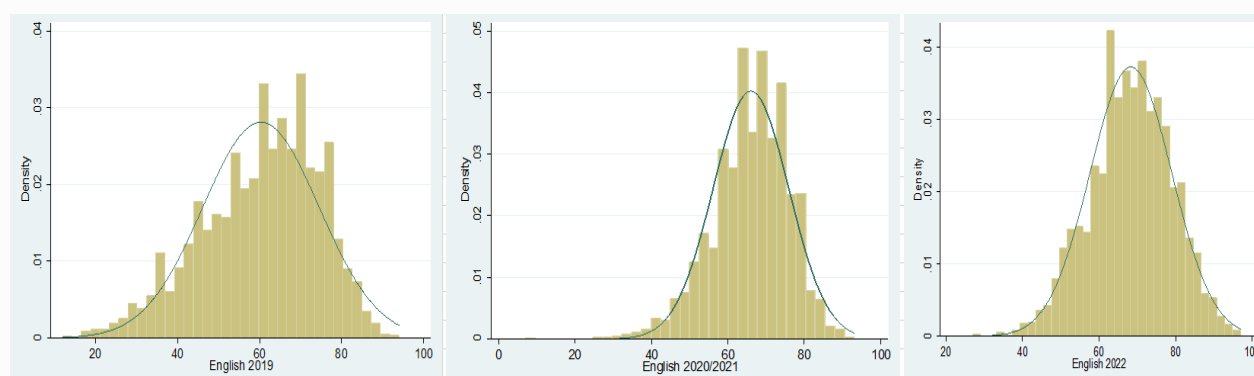


Figure 156: Distribution of Scores in English Subject

Figure 156 shows the distribution of scores in English subject in TTC in 2019, 2021, and 2022. Generally, the distribution curves are asymmetrical (left skewed) with scores concentrated on the right and some few spread at the extreme sides of the curves. The implication is that the performance in English subject improved

over the years, as evidenced by the increase in the range of scores and the shift in the concentration of scores towards the right.

3.4.8 Performance in Creative Performance and Physical Education (CPPE)

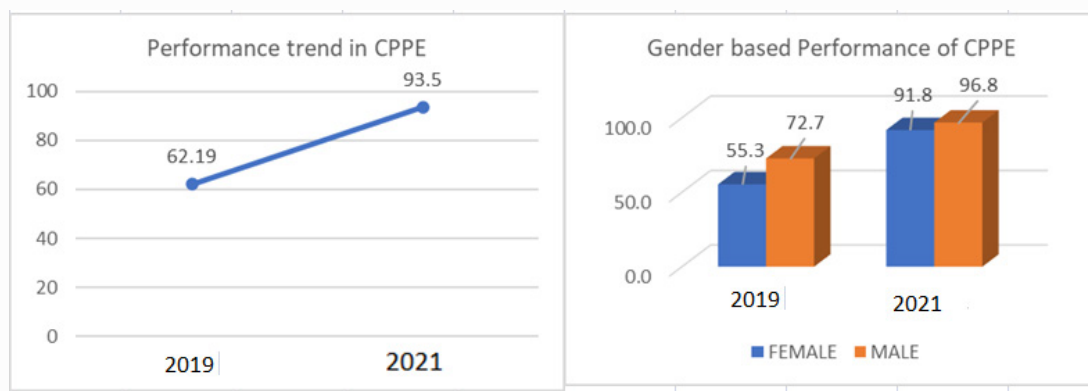


Figure 157: General pass rate in CPPE and pass rate by gender

Figure 157 shows students' pass rates in Creative Performance and Physical Education (CPPE) subject in 2019 and 2021. According to the figure, there was a significant improvement from 62.19% in 2019 to 93.5% in 2021. There was a significant improvement in pass rates indicating that efforts to improve student performance were fruitful and need to be sustained.

The performance by gender in the Creative Performance and Physical Education (CPPE) subject for TTC shows a positive trend in both male and female pass rates. In 2019, 58.3% of female students and 72.7% of male students passed the subject. Worth noting, in 2021, the pass rates for both female and male students significantly increased to 91.8% and 96.8% respectively. Gender disparity in pass rates decreased from 14.4% in 2019 to 5% in 2021. This indicates that efforts to improve student performance benefited both female and male students. It is important to continue monitoring student performance with a gender consideration to inform improvement initiatives.

Summary statistics for performance in CPPE

Summary statistics of the Mean score, Variation Coefficient (VC) and Standard Deviation (SD) in CPPE scores.

Table 40: Average score and Variation Coefficient and Standard Deviation in CPPE

	2019	2021
Mean	45.8	57.9
SD	17.3	11.6
VC	37.8	20.0
N	3,966	2,947

Table 45 shows the mean score, standard deviation, variation coefficient, and sample size for CPPE subject in two school years: 2019 and 2021. In 2019, the mean score was 45.8 and the standard deviation was 17.3. This indicates that the scores were widely dispersed from the mean score. The variation coefficient of 37.8% is high, indicating that the dispersion of scores is quite large relative to the mean score. In 2021, the mean score increased to 57.9, and the standard deviation decreased to 11.6 and the variation coefficient decreased to 20.0%, indicating a lower dispersion of scores compared to the mean score. Despite the fact that the number of students who sat for ECPE examination reduced from 3,966 in 2019 to 2,947 in 2021, there was a significant improvement in students' pass rates in the subject.

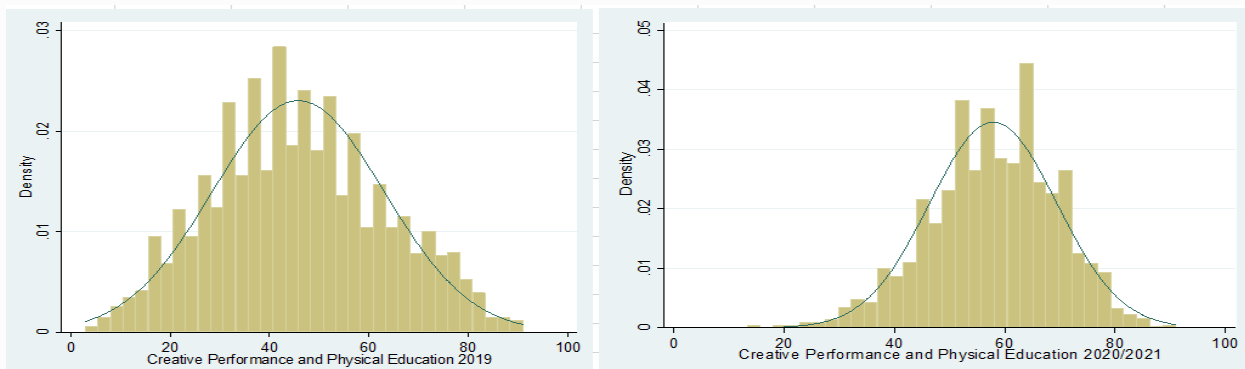


Figure 158: Distribution of Scores in CPPE

From the curves in the above figure, there was high variability in the scores relative to the mean. The distribution of scores in CPPE subject for TTC in 2019 appear to be symmetrical, but with high variability relative to the mean. In 2021, the curve is asymmetrical with scores concentrated to right but some few at extremes. This means that there was less variability in the scores compared with 2019. This indicates that there were some students who performed poorly and some who performed exceptionally well in the subject in both years. Overall, the distribution curve shows a normal distribution, which means that most of the students scored around the average score and the performance of the students was spread out evenly around the average score.

3.4.9 General pass rate and Performance in TTC Kinyarwanda national exam

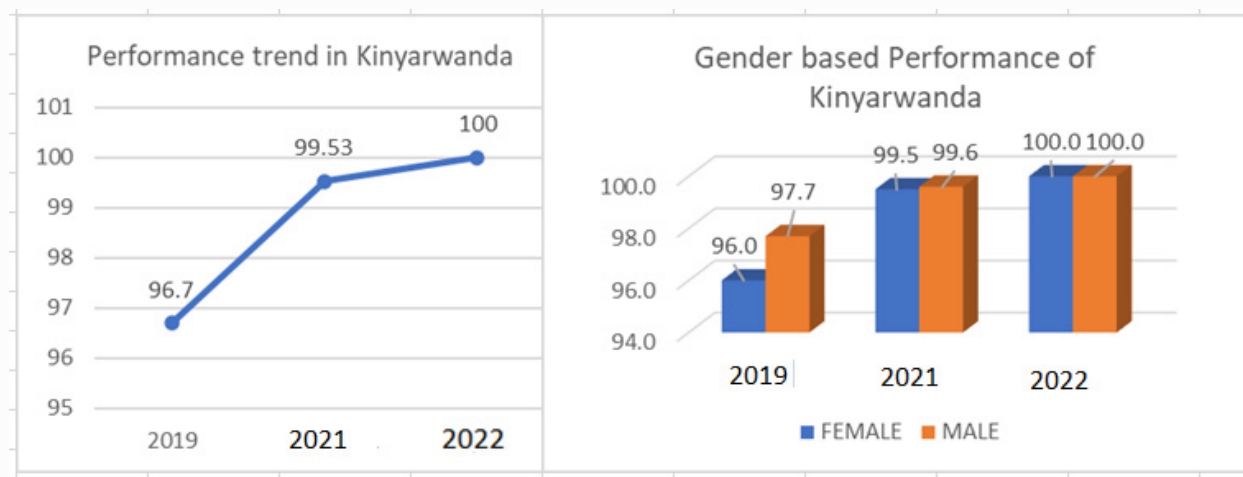


Figure 159: General pass rate trend in Kinyarwanda and pass rate by gender

Figure 159 shows the trend of pass rates in Kinyarwanda subject for TTC in 2019, 2021, and 2022. In 2019, the pass rate was 96.7%, indicating that a majority of the students who took Kinyarwanda subject exam passed. In 2021, the pass rate increased to 99.53% indicating an improvement in pass rate from the previous year. In 2022, the pass rate reached 100%, which is an excellent performance. Overall, the trend in pass rates for Kinyarwanda subject in TTC was positive, indicating that all students passed the subject. It is important to continue supporting and encouraging students to excel in Kinyarwanda subject as it is a critical aspect of the Rwandan culture and identity.

Data in figure 159 also shows that both females and males had high pass rates in Kinyarwanda subject across all years. In 2019, 96% of females and 97.7% of males passed the subject. In 2021, 99.5% of females and 99.6% of males passed the subject, and in 2022, 100% of both females and males passed the subject. The gender gap in pass rates between females and males was minimal in all years. In 2019, the difference in pass rate was 1.7%, with males performing slightly better. In 2021, the difference in pass rate was only 0.1%, with males performing slightly better. The pass rates were equal for both females and males in 2022. Overall, the data indicates that there is no significant difference in pass rates between females and males in Kinyarwanda subject at TTC for the three school years analyzed.

Summary statistics for performance in Kinyarwanda

Summary statistics of the Mean score, Variation Coefficient (VC) and Standard Deviation (SD) in Kinyarwanda scores are presented in the following table.

Table 41: Average score and Variation Coefficient and Standard Deviation in Kinyarwanda

	2019	2021	2022
Mean	60.9	68.2	67.3
SD	10.9	11.0	9.3
VC	17.9	16.1	13.8
N	3,997	2,979	2,909

According to table 41, the mean scores in Kinyarwanda increased from 60.9 in 2019 to 68.2 in 2021 and then slightly decreased to 67.3 in 2022. The standard deviation (SD) remained relatively consistent across the three years, with values of 10.9, 11.0, and 9.3. The variation coefficient (VC) shows that the variation in scores has decreased over time, with a value of 17.9 in 2019, 16.1 in 2021, and 13.8 in 2022. The number of students examined also decreased over the years, from 3,997 in 2019 to 2,979 in 2021 and 2,909 in 2022 respectively. Overall, the data suggests an improvement in the average scores and a decrease in variation, but with a decreasing number of students sitting for the national exams over time.

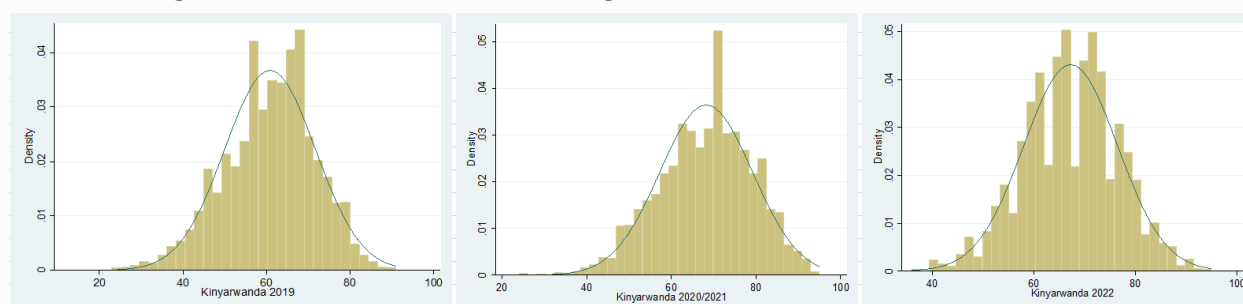


Figure 160: Distribution of Scores in Kinyarwanda

As depicted in the above distribution curves the scores in Kinyarwanda subject in TTC in 2019, 2021, and 2022 are concentrated on the right and some few spread at the extreme sides of the curves. Generally, curves are asymmetrical and skewed towards the left. This implies that the performance in Kinyarwanda subject improved over the years, as evidenced by the increase in the range of scores and the shift in the concentration of scores towards the right. Overall, the trend indicates a slight improvement in student performance in the Kinyarwanda subject over the three-year period, with more students scoring towards the upper end of the range. However, there were still students who scored below average, which suggests that more efforts are needed to support teaching learning process and improve students' performance.

3.4.10 General pass rate and Performance in Integrated Sciences

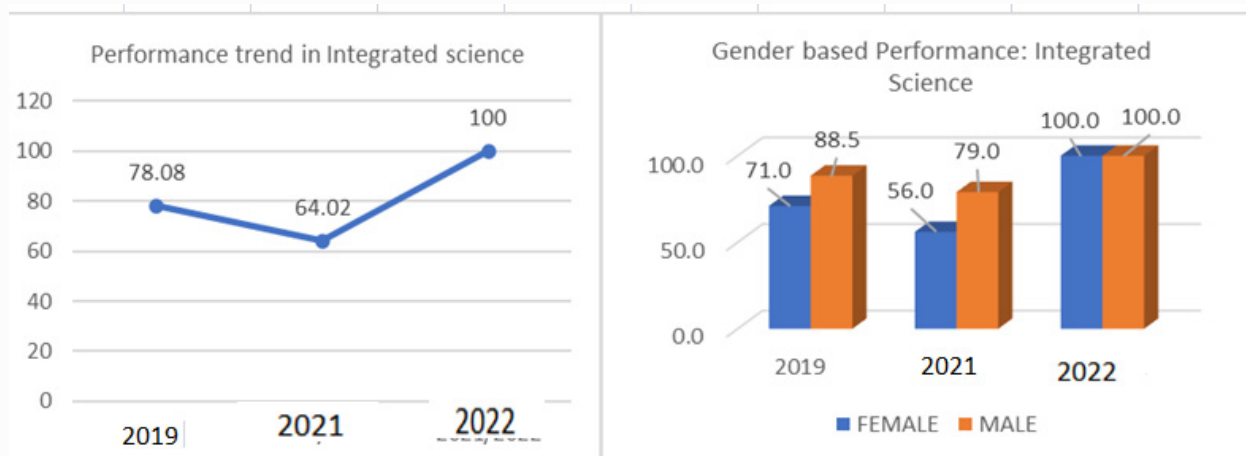


Figure 161: Performance trend in Integrated Sciences and performance by gender

Figure 161 shows the performance trend of students in Integrated Sciences in TTC over three years; 2019, 2021, and 2022 respectively. In 2019, the pass rate for Integrated Sciences in TTC was 78.08%. This suggests that a relatively high percentage of students passed the subject exam that year. In 2021, the pass rate decreased to 64.02%, which indicates a decline in student performance as compared to the previous year (2019). However, in 2022, the pass rate increased to 100%, indicating that all students who sat for the exam passed. This is a significant improvement from the previous year and implies that efforts were made to improve students' learning and performance. Overall, the trend in the pass rate for Integrated Sciences in TTC shows some fluctuations over the three-year period, with a high pass rate in 2019, a decrease in 2021, and a significant improvement to 100% in 2022. This highlights that while there may have been challenges or factors affecting student performance in the subject, efforts to address these challenges were successful in improving student learning and outcomes especially in 2022.

Figure 161 also shows performance by gender in the Integrated Sciences subject for TTC over three consecutive years; 2019, 2021, and 2022 respectively. In 2019, the pass rate for female students in Integrated Sciences in TTC was 71%, while for male students, it was 88.5%. This suggests that male students performed better in the subject than female students in that year. In 2021, the pass rate for female students decreased to 56%, while that of male students decreased to 79%. Again, this suggests that male students performed better in Integrated Science than female students in 2021 year though the percentage slightly decreased as compared to the one in 2019. However, in 2022, there was a significant improvement in the performance of both female and male students, with a 100% pass rate. This infers that efforts were made to address the performance gaps between male and female students in the subject, and these efforts were successful in improving the learning and outcomes for both genders. Overall, the trend in gender performance in the Integrated Sciences subject for TTC shows that male students

generally performed better than female students in the subject in both 2019 and in 2021. However, there was a significant improvement in the performance of both genders in 2022, implying that efforts to address the gender gap were successfully implemented. It is therefore paramount to continue to monitor and address any potential gender disparities in performance to ensure that all students have equal opportunities to learn and succeed.

Summary statistics for performance in Integrated Sciences

Summary statistics presented here is for the Mean score, Variation Coefficient (VC) and Standard Deviation (SD) in Integrated Sciences scores.

Table 42: Average score, Variation Coefficient and Standard Deviation in Integrated Sciences

	2019	2021	2022
Mean	48.9	45.0	52.4
SD	12.7	16.5	13.3
VC	25.9	36.8	25.4
N	1,852	1,537	453

Table 42 shows the mean score, standard deviation (SD), variation coefficient (VC), and N (sample size) for Integrated Sciences subject over three consecutive years; 2019, 2021, and 2022. The mean score for Integrated Sciences increased from 48.9 in 2019 to 52.4 in 2022, indicating an overall improvement in student's performance in the subject over the three-year period. However, the mean score decreased in 2021 to 45.0, suggesting a slight decline in student performance. The standard deviation for Integrated Sciences increased from 12.7 in 2019 to 16.5 in 2021, indicating a greater variability in student scores in 2021. The SD then decreased to 13.3 in 2022, indicating that scores were less variable that year. The variation coefficient (VC), which measures the relative variability in the data, increased from 25.9 in 2019 to 36.8 in 2021, suggesting that there was greater variability in scores in 2021. The VC then decreased to 25.4 in 2022, indicating less relative variability in student scores. Overall, the data suggest that there was some variability in student scores for Integrated Sciences over the three-year period, with a temporary decline in performance in 2021. However, there was an overall improvement in mean scores and a decrease in variability in 2022.

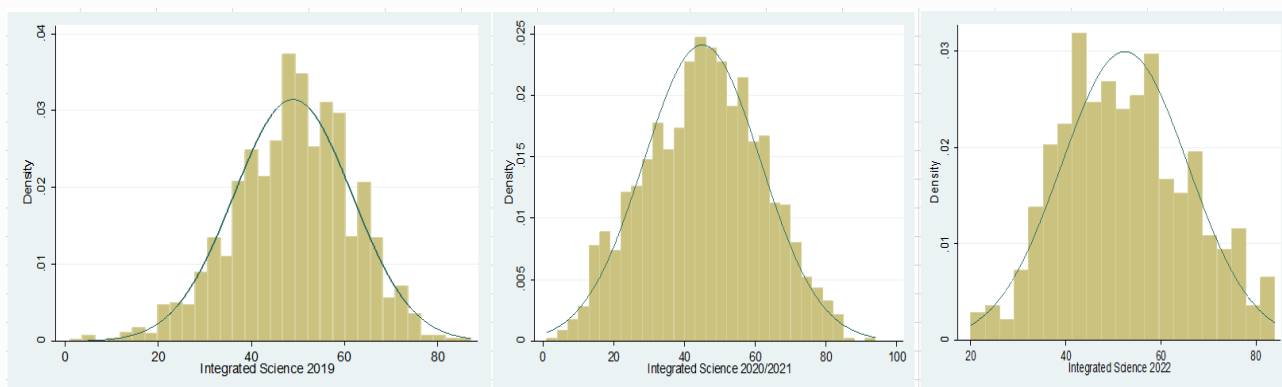


Figure 162: Distribution of Scores in Integrated Sciences

Figure 162 shows the distribution of scores for the Integrated Sciences subject in three consecutive years; 2019, 2021, and 2022. In 2019, the majority of student scores in Integrated Sciences were skewed towards the right with some few on the extreme sides of the curve, but in 2021, it was the reverse. This means that the performance in 2021 was relatively low compared to 2019. In 2022, there was a significant improvement in student scores, with the majority of scores concentrated towards the right.

Overall, the trend in the distribution of scores for Integrated Sciences indicates that there was a gradual improvement in student performance over the three-year period, with a decline in 2021. Basically, the improvement in student scores in 2022 may indicate that efforts to improve student learning and outcomes in the subject were successfully implemented. However, it is important to continue monitoring student performance in the subject to ensure that all students have equal opportunities to learn and succeed.

3.4.11 General pass rate and performance in Numeracy and Mathematics (NM)

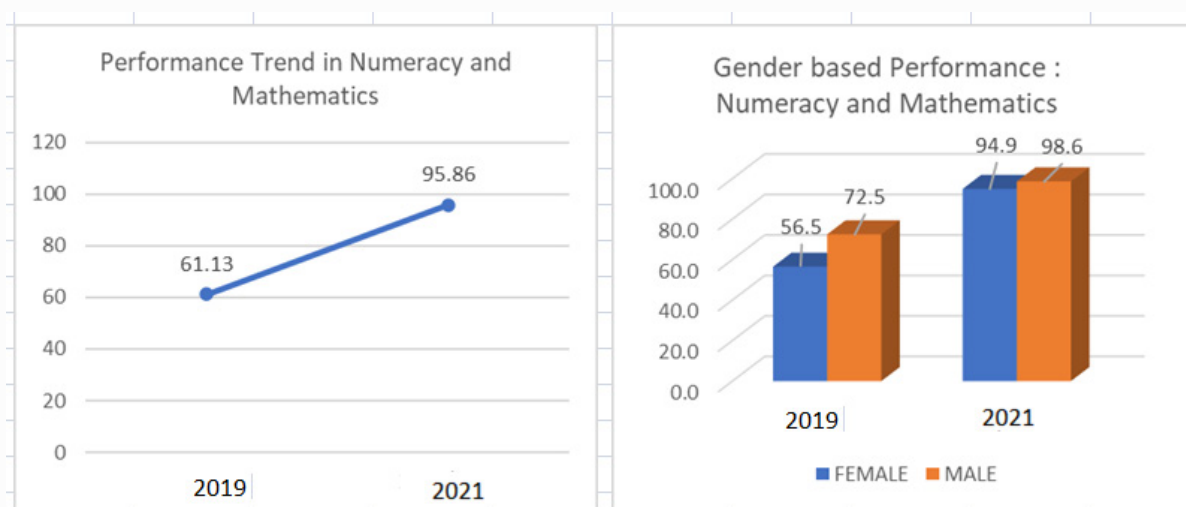


Figure 163: General pass rate trend in NM and pass rate by gender

Figure 163 shows the performance trend of students in Numeracy and Mathematics (NM) subject for two consecutive years; 2019 and 2021. In 2019, the pass rate for

the subject was 61.13%, indicating that a significant proportion of students did not meet the minimum requirements for passing the subject. However, in 2021, there was a dramatic improvement in student performance, with a pass rate of 95.86%. This significant improvement in student performance in the NM subject between 2019 and 2021 can be attributed to various factors that need to be considered for sustainable improvement.

Overall, the trend in the distribution of scores for Integrated Sciences infers that there was a gradual improvement in student performance over the three-year period, with a slight decline in 2021.

Figure again shows the performance of students by gender in Numeracy and Mathematics (NM) subject for two years (2019 and 2021). In 2019, 56.5% of females and 72.7% of males passed the NM subject. This indicates that there was a significant gender gap in performance, with males outperforming females in the subject. However, in 2021, there was a significant improvement in the performance of both gender, with 94.9% of females and 98.6% of males passing the NM subject. This indicates that gender gap in performance tremendously reduced, between males and females in 2021. The significant improvement in the performance of both sexes in 2019 and 2021 can be attributed to several factors, including changes in the curriculum, improved teaching methods, and increased support for students. In conclusion, the significant reduction in the gender gap in performance between 2019 and 2021 in the NM subject might be an indication of the efforts made towards promoting gender equality in education. To this end, continued efforts to provide equal opportunities and support for all students, regardless of gender, will likely result in even better outcomes for all students in the future.

Summary statistics in NM

Table 43: Average score, Variation Coefficient and Standard Deviation in NM

	2019	2021
Mean	43.6	65.5
SD	13.3	13.6
VC	30.4	20.8
N	692	556

Table 43 shows the mean score, standard deviation, variation coefficient, and Population size for the Numeracy and Mathematics (NM) subject for 2019 and 2021. The average score for the NM subject in 2019 was 43.6, which increased significantly to 65.5 in 2021. This indicates a significant improvement in the performance of students in the subject over the two years. The standard deviation also remained relatively consistent between the two years, with a slight increase from 13.3 in 2019 to 13.6 in 2021. The variation coefficient (VC) decreased also from 30.4 in 2019 to 20.8

in 2021, indicating a reduction in the variability of scores among the students in the subject. The increase in the average score for the NM subject and the decrease in the variation coefficient in 2021 can be attributed to several factors, including changes in the curriculum, improved teaching methods, and increased support for students. Additionally, the increased focus on STEM (Science, Technology, Engineering, and Mathematics) education may have played a role in motivating students to excel in the subject. In conclusion, the significant improvement in the performance of students in the NM subject between 2019 and 2021 is a positive indication of the efforts made towards improving STEM education in the country. Continued efforts to improve the quality of STEM education will likely result in even better outcomes for students in the future.

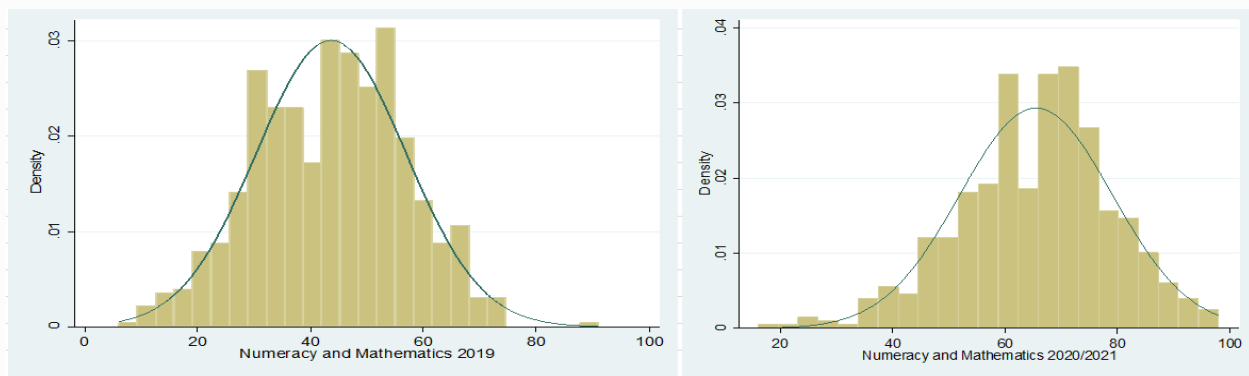


Figure 164: Distribution of Scores in Numeracy and Mathematics

Figure 164 shows the distribution of scores in the Numeracy and Mathematics (NM) subject over two consecutive years, 2019 and 2021. In 2019, the majority of students' scores were concentrated in the range of 20 to 75, with few scores below 20 and few scores above 75. This indicates that the majority of students performed moderately well in the NM subject, with some students performing exceptionally well and others fairly performing. In 2021, there was a significant shift in the distribution of scores, with the majority of students' scores concentrated in the range of 40 to 95. Additionally, the increased focus on STEM education may have played a role in motivating students to excel in the subject. In conclusion, the shift in the distribution of scores in the NM subject from 2019 to 2021 indicates a significant improvement in student performance.

3.4.12 Pass rates in General Science and Mathematics (GSM)

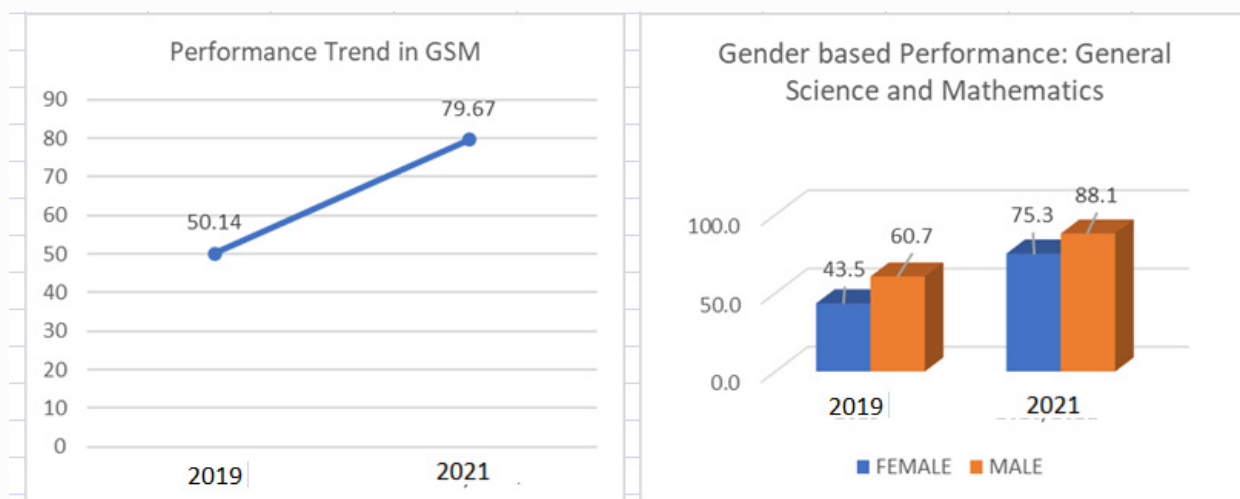


Figure 165: Performance trend in GSM and performance by gender

The performance trend in the General Science and Mathematics (GSM) subject for TTC shows an improvement from 50.14% in 2019 to 79.67% in 2021 as indicated in figure. This indicates an increase in the pass rate by almost 30 percentage points over the two years. It is necessary that factors influencing students' pass rates in GSM be investigated so that lessons to improve pass rates in other subjects are taken.

Figure 165 also shows that the pass rates respectively for male and female students have improved from 43.5% and 60.7% in 2019 to 75.3% and 88.1% in 2021. While the overall improvement in pass rates is positive, there still appears to be a gap in the performance of females and males. Male students have consistently outperformed female students.

Summary statistics in General Science and Mathematics

Table 44: Mean score, SD and CV in General Science and Mathematics

	2019	2021
Mean	40.0	50.5
SD	11.9	13.2
VC	29.6	26.2
N	2,145	1,443

Table 44 shows the average score, standard deviation (SD), variation coefficient (VC), and number of students (N) for the General Science and Mathematics (GSM) subject in 2019 and 2021. Comparing the mean score between 2019 and 2021, it is evident that there is an improvement from 40.0 to 50.5. There was also an increase in the standard deviation and variation coefficient from 2019 to 2021,

which means that the performance of students was more spread out in 2021. This suggests that there were a greater number of high and low-performing students in 2021 than in 2019. It's worth noting that the number of students who sat for final exams in 2021 is less than the number of students in 2019, which could impact the total number of results. Overall, the data suggests an improvement in the mean score in General Science and Mathematics from 2019 to /2021, but with more variation in performance in/2021.

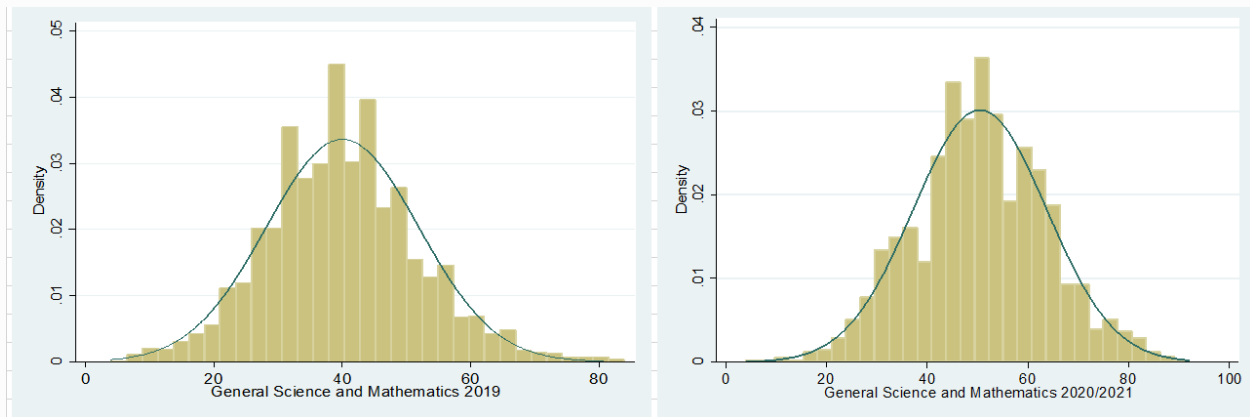


Figure 166: Distribution of Scores in General Science and Mathematics

Figure 166 indicates the distribution of scores in the General Science and Mathematics (GSM) subject for TTC. The figure shows that in 2019, the majority of students scored between 20 and 60, with few students scoring below 20 or above 60. In 2021, majority of students scored between 20 and 80, with few students scoring below 20 or above 80. The normal distribution curve in 2021 is slightly wider than in 2019, indicating that there was more variation in scores in that year. Overall, there was an improvement in student performance in General Science and Mathematics in 2021 as compared in 2019, as evidenced by the increase in the percentage of students who passed the subject and the increase in the mean score.

3.4.13 General pass rate and Performance in TTC Kiswahili national exam

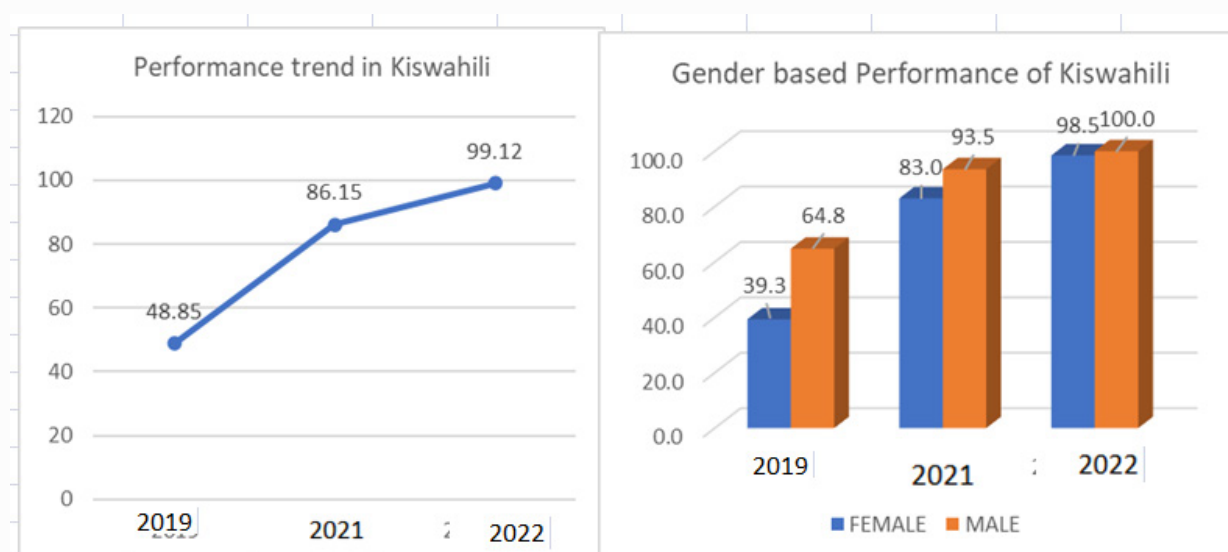


Figure 167: General pass rate trend in Kiswahili and pass rate by gender

Figure 167 shows that the pass rate in Kiswahili for TTC has significantly improved over the years. In 2019, the pass rate was only 48.85%, but in 2021 it improved to 86.15%, and in 2022 it increased further to 99.12%. This indicates that there has been a positive trend in the performance of students in Kiswahili. Pass rates of both male and female students have significantly improved over the years. In 2019, only 39.3% of female students passed the subject while 64.8% of male students passed. In 2021, the pass rate for female students increased to 83% while for male students it increased to 93.5%. In 2022, the pass rate for female students increased to 98.5%, while all male students passed the subject. This data implies that both male and female students have made significant progress in their performance in Kiswahili subject over the years. However, there is still a gap on the side of female students whereby the pass rate is not yet 100%.

Summary statistics in Kiswahili

Table 45: Average score and Variation Coefficient and Standard Deviation in Kiswahili

	2019	2021	2022
Mean	41.2	56.8	62.3
SD	18.8	15.1	15.0
VC	45.7	26.6	24.1
N	1,173	686	685

As can be seen in Table 45, in 2019, the average score for Kiswahili was 41.2 with a high SD of 18.8, indicating a wide range of scores among the students. The VC was also high at 45.7%, indicating a high level of variation in the scores. The VC also decreased to 26.6%, which is an improvement from the previous year. In 2022, the

average score increased further to 62.3, with a minimal decrease in SD to 15.0. The VC decreased to 24.1%, which shows an improvement in the consistency of the scores. The number of students in 2022 was 685. Overall, the data presented on the figure above signifies that there has been an improvement in the average scores for Kiswahili subject in the last three years, accompanied by a decrease in variation and improvement in consistency. The high variation coefficient in 2019 indicates that the scores were more spread out, but the trend has since improved in the subsequent years.

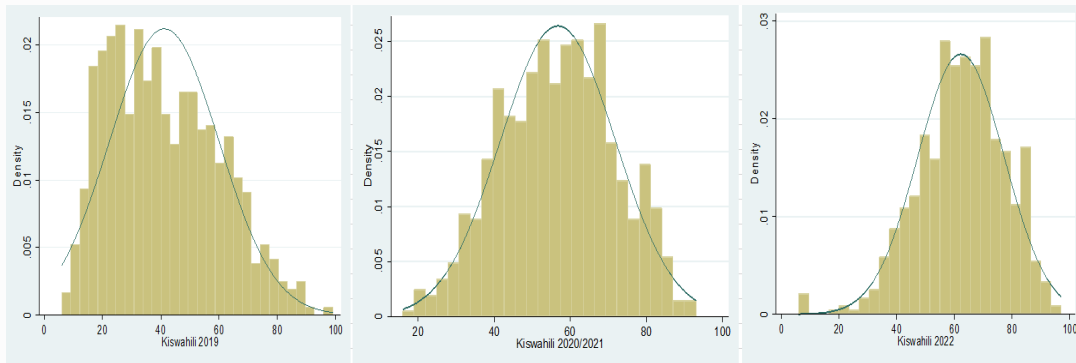


Figure 168: Distribution of Scores in Kiswahili

Figure 168 shows that distribution of scores in Kiswahili in 2019 was asymmetrical with majority concentrated on the left and few on the extreme sides of the curve. In 2021, the scores were more evenly distributed, with a concentration in the range of 20 to 80, with some scores below 20 and above 80. In 2022, the scores were again more evenly distributed, with a concentration on the right and it was the same case in 2022. The change in the distribution of scores in 2021 and in 2022 shows improvement in the overall performance of students in Kiswahili subject. The concentration of scores in the higher range in 2021 and 2022 suggests that more students are scoring well in the subject.

3.4.14 General pass rate and Performance inTTC Entrepreneurship national exam

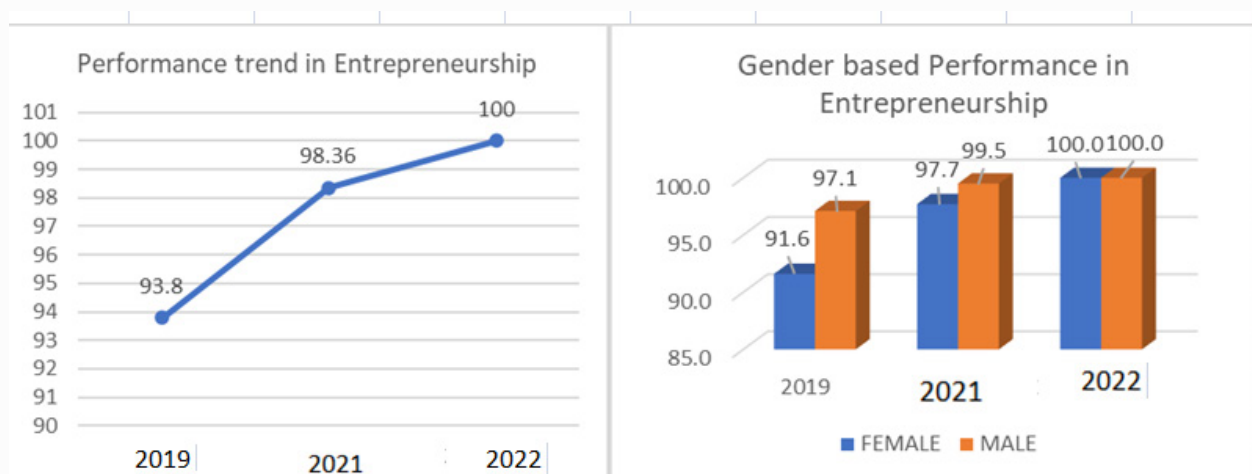


Figure 169: General pass rate trend in Entrepreneurship and pass rate by gender

Figure 169 shows the performance trend in entrepreneurship subject for TTC (Teacher Training Center) in terms of pass rate. The pass rate for entrepreneurship was 93.8% in 2019, and it increased to 98.36% in 2021, and to 100% in 2022. This indicates a consistent improvement in the performance of TTCs in entrepreneurship subject over the years. The increase in pass rates suggests that TTCs have been providing effective training and support to students in entrepreneurship, leading to better outcomes in terms of student success. This trend is a positive indication of the quality of entrepreneurship education provided by TTCs and their commitment to improving their programs over time.

In terms of gender, in 2019, the pass rate for female students was 91.6%, which was lower than that of male students at 97.1%. However, in the following year (2021), the pass rate for female students increased significantly to 97.7%, while the pass rate for male students increased only slightly to 99.5%. In 2022, both male and female students had a pass rate of 100%. This indicates that there was a tremendous improvement in the performance of female students from 2019 to 2021, which continued to 2022. The gender disparity in pass rates also reduced significantly in the two years, with female students performing almost similarly to male students in 2021 as well as in 2022. This could be attributed to various factors such as changes in teaching methods, increased support for female students, and a better understanding of the subject. In conclusion, the performance by gender in the Entrepreneurship subject for TTC has shown a significant improvement, with a reduction in the gender gap in pass rates in the last two years.

Summary statistics in Entrepreneurship

Table 46: Average score, Variation Coefficient and Standard Deviation in Entrepreneurship

	2019	2021	2022
Mean	71.1	76.3	78.9
SD	17.1	14.1	13.5
VC	24.0	18.5	17.1
N	4,001	2,980	2,909

From Table 46, the mean score for entrepreneurship has increased from 71.1 in 2019 to 76.3 in 2021 and to 78.9 in 2022, indicating an improvement in the overall performance of students in this area. The standard deviation has also decreased from 17.1 in 2019, 14.1 in 2021 to 13.5 in 2022, which means that the scores of students are becoming more consistent. The variation coefficient, which measures the degree of variation in the scores relative to the mean, has also decreased from 24.0 in 2019, 18.5 in 2021 to 17.1 in 2022. This suggests that the range of scores is becoming narrower, indicating that there is less variability in the performance of students in entrepreneurship. Finally, the sample size has decreased over the years, from 4,001 in 2019, 2,980 in 2021 to 2,909 in 2022.

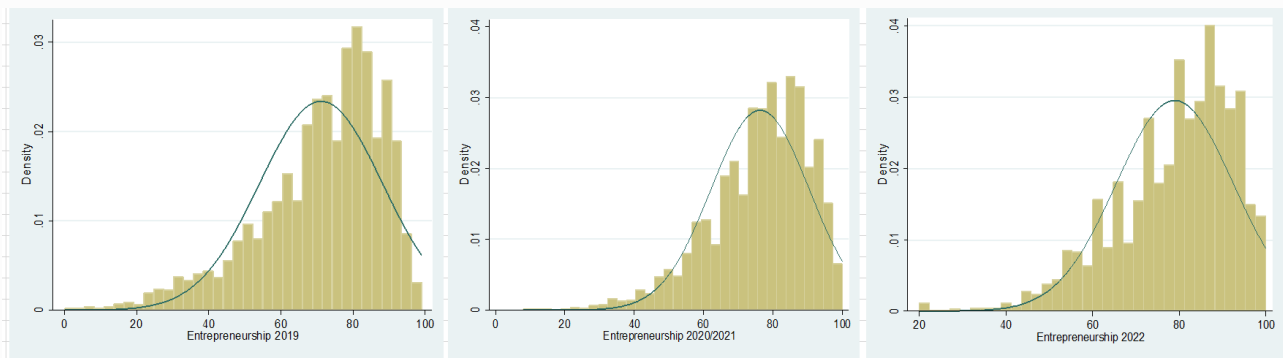


Figure 170: Distribution of Scores in Entrepreneurship

Figure 170 shows the distribution of scores in Entrepreneurship subject over three years. For all the three years, the scores were concentrated towards the left, which indicates that most students generally performed well in the three years. However, some students who performed poorly as indicated the left tails of the curves. Overall, the trend in the distribution of scores denotes that students' performance in Entrepreneurship subject has been improving over the years, with fewer students scoring poorly and more students performing well.

3.4.15 General pass rate and Performance in Teaching Practice

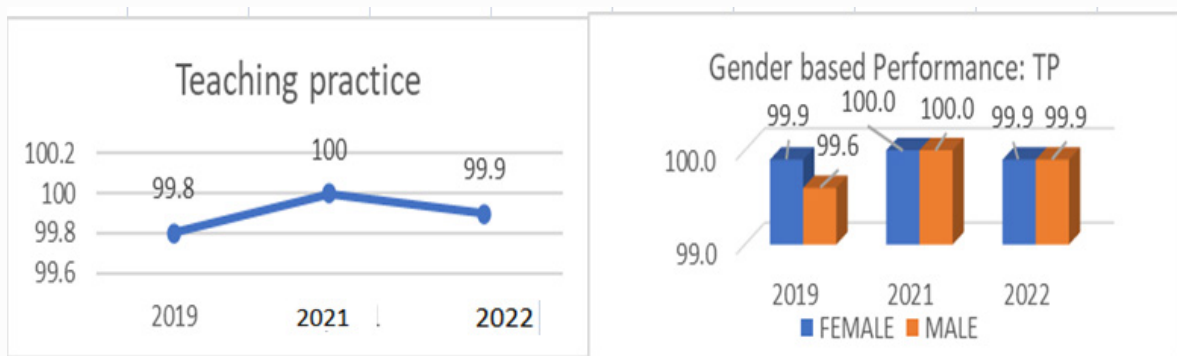


Figure 171:—Pass rate trend in Teaching Practice and pass rate by gender

Based on the data presented in Figure 171, it is evident that the pass rate for the Teaching Practice subject at TTC remained consistently high over the past three years. In 2019, the pass rate was 99.8%, which increased to 100% in 2021, and remained high at 99.9% in 2022. This indicates that the students at TTC performed very well in the Teaching Practice subject over the past three years. It also suggests that the quality of teaching and training provided by the TTCs has been effective in preparing the students teachers to become effective future teachers since teaching practice involves putting theory into practice. The data may also suggest that there were no major changes or challenges that affected the performance of students in Teaching Practice over the three years. However, further analysis and context may be needed to fully interpret and understand the performance trend.

Based on the data presented in Figure 171, it appears that there was no significant difference in performance in the Teaching Practice subject between female

and male students. In all three years, the pass rates for both male and female students were very high, with little to no variation between gender. Specifically, in 2019, 99.9% of female students passed the subject, compared to 99.6% of male students. In 2021, 100% of both female and male students passed, and in 2022, 99.9% of female students passed, compared to 99.9% of male students. Overall, it appears that both male and female students performed at a similar level in this subject.

Summary statistics in Teaching Practice

Table 47: Average score, Variation Coefficient and Standard Deviation in Teaching Practice

	2019	2021	2022
Mean	91.9	92.6	92.6
SD	4.1	3.1	3.4
VC	4.5	3.3	3.7
N	3,974	2,981	2,909

According to Table 47, the mean scores for the three years show that students' performance in Teaching Practice was very high and it slightly increased from 91.9 in 2019 to 92.6 in 2021 and 2022. The standard deviations and variation coefficients were low and decreased from 4.1 in 2019 to 3.1 in 2021 to 3.4 in 2022, which suggests that the variations in scores relative to mean were generally low.

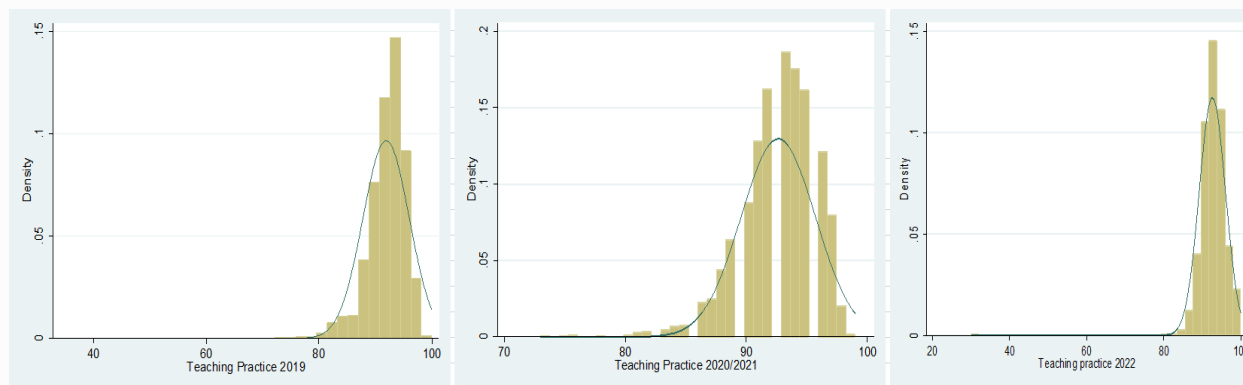


Figure 172: Distribution of Scores in Teaching Practice

The distribution of scores in the Teaching Practice subject are concentrated in the higher range as indicated in Figure 172. In 2019, the scores were concentrated in the range of 80 to 100 and this remained consistent in 2021 and 2022, with no scores below 80. This implies that the students generally performed well in this subject, with few students scoring below the average score.

3.4.16 General Pass rates and performance in new Subjects Examined in 2022

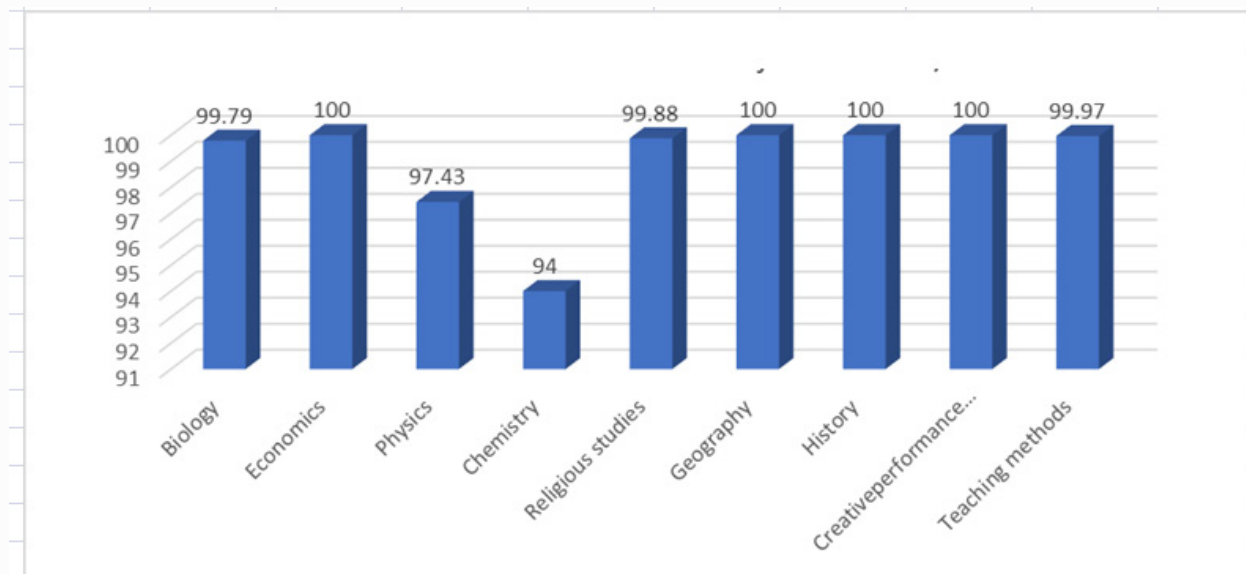


Figure 173: Performance trend in TTC Subjects Examined in 2022

Based on the pass rates provided in figure173, the average pass rate is 98.80%. In terms of individual subjects, Economics, Geography, History, and Creative Performance had excellent pass rates of 100 followed by Biology, Religious Studies, Teaching Methods, Physics and chemistry that also had excellent pass rates of 99.79, 99.88, 99.97, 97.43 and 94 respectively. Overall, the data provided on the graph above implies that, pass rates were excellent in all subjects.

Pass rates (%) disaggregated by sex in 2022

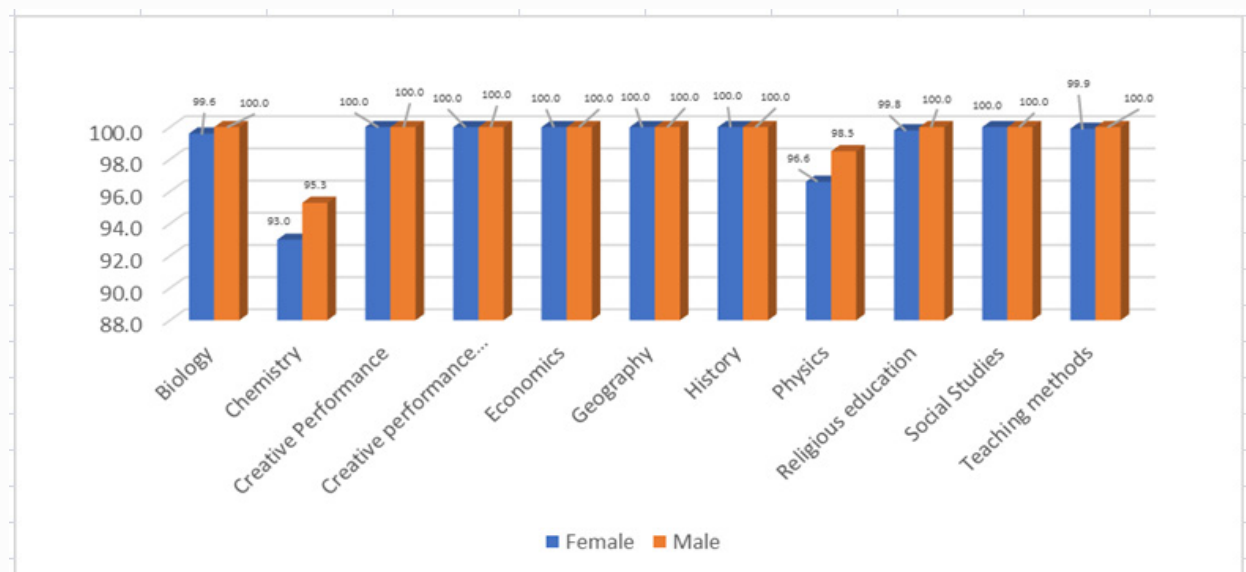


Figure 174: Pass rates disaggregated by sex

Figure 174 presents students' pass rates disaggregated by sex. Accordingly, there seems to be a slight variation in the performance of female and male students across different subjects. In some subjects including Biology, Chemistry, and Physics males performed slightly better than females. Overall, the performance of both female and male students was outstanding, with all scores falling between 93% and 100%. It is important to note that there were no significant variations between the pass rates of females and those of males in the different subjects.

Summary statistics in new subjects

Table 48: Average score and Variation Coefficient and Standard Deviation of other TTC Subjects

	Teaching Methods	Biology	Chemistry	Physics	Religious education	Creative performance (Music and Fine Arts)	Geography	History	Creative performance
Mean	74.9	54.9	40.5	45.6	93.7	59.6	72.3	81.8	64.9
SD	11.8	15.6	16.1	14.3	5.6	13.7	11.4	11.3	14.5
VC	15.7	28.5	39.8	31.2	6.0	22.9	15.8	13.8	22.4
N	2,909	933	933	933	837	453	837	837	837

Table 48 provides the mean score, standard deviation, variation coefficient, and the number of students for each nationally examined subject at TTC in 2022. The mean score for each subject ranges from 40.5 for chemistry to 93.7 for Religious Education, indicating that the performance of students varies significantly across subjects. A high SD indicates that the data is widely spread out from the mean, while a low SD indicates that the data is tightly clustered around the mean. In this case, Chemistry has the highest SD of 16.1, indicating that there is a relatively large amount of variation in student performance in this subject. On the other hand, Religious Education has the lowest SD of 5.6, indicating that student performance in this subject is relatively consistent. The variation coefficient (VC) is another measure of variability, calculated as the ratio of the standard deviation to the mean, expressed as a percentage. A high VC indicates that the data has a high degree of variability relative to the mean, while a low VC indicates that the data has low variability relative to the mean. In this case, chemistry has the highest VC of 39.8%, indicating that there is a relatively high degree of variability in student performance in this subject relative to the mean score of 40.5. On the other hand, Religious Education has the lowest VC of 6.0%, indicating that there is relatively low variability in student performance in this subject relative to the mean score of 93.7. It is also important to note that the number of students varies across subjects depending on the subject option/ combination pursued by a student. Overall, the data in the table suggests that there is a significant variation in student

performance across subjects, with some subjects showing more variability than others.

3.5. Analysis of Level 5 TVET National Examination results

This section presents results of the analysis of national examinations for TVET trades for 2019, 2021 and 2022. The analysis focused on general performance and pass rate in each trade, pass rate by gender, by type of institution ownership,

Table 49: General pass in all TVET trades National examinations

TVET level five						
	2019		2021		2022	
Number of students	No.	%	No.	%	No.	%
Number of registered students	19,370	100%	22,686	100%	21,340	100%
Number of students who sat for all exams	19,231	99.3%	22,523	99.3%	21,227	99.5%
Number of students who passed	17,530	91.2%	21,768	96.6%	20,752	97.8%

Table 49 provides information on the performance of candidates who sat for the TVET level five national examination over three consecutive years. The table is divided into three sections, representing the results from 2019, 2021, and 2022. The first row of the table shows the total number of candidates who registered for the exam in each of the three years. In 2019, 19,370 candidates registered for the exam, while in 2021, the number increased to 22,686. However, in 2022, the number decreased to 21,340. The second row shows the number and percentage of candidates who sat for all exams. In all three years, the percentage of candidates who sat for all exams was very high, ranging from 99.3% to 99.5%. The third row shows the number and percentage of candidates who passed the exam. In 2019, 17,530 candidates passed the exam, representing 91.2% of all candidates who sat for the exam. This percentage increased to 96.6% in 2021 and 97.8% in 2022.

Overall, the table shows that the number of candidates who registered for the exam increased from 2019 to 2021 but decreased in 2022. However, the percentage of candidates who sat for all exams remained very high in all three years. The percentage of candidates who passed the exam also increased from 2019 to 2022.

3.5.1 General pass rate and performance in TVET trade of Accounting(ACC) in Core subjects

This section presents results of the analysis of ACC trade including general performance and pass rate, pass rate by gender and by type of school ownership. Table 50 provides information about the total number of students who sat for National Examinations in the Accounting trade across three academic years, from 2019 until 2022.

Table 50: Total number of students who sat for the trade of Accounting (ACC) exam

Subjects	2019	2021	2022
Credit management and creditors account	3696	3677	3894
Financial accounting	3696	3677	3894
Monitoring inventory system and costing	3696	3677	3896
Practical ACC	3696	3678	3895
Principle of auditing and ethics in accounting	3696	3677	3894
Principles of economics	3696	3677	3894
Taxation	3696	3677	3894

Looking at the data, the total number of students who attended courses in accounting remained consistent over the three years, with a total of 3,696 students attending courses in all subjects in 2019. In the academic year 2021, a total number of students (3677) attended almost all subjects. Only a slight increase in the number of students who attended the practical ACC course, from 3,677 to 3,678 was registered.

In the most recent academic year, 2022, the total number of students attended accounting course increased slightly, with a total of 3,894 students attending courses in almost all subjects except the subjects of Monitoring inventory system and costing with 3896 students and Practical ACC with 3895 students. Overall, the data in the table suggests that there has been some stability in the number of students attending courses in accounting over the past three years, with only slight fluctuations in attendance for individual courses. The slight increase is observed considering three years whereby in 2019 has 3696 attended students and 3896 students in 2022.

Table 51: Pass rate in Accounting Trade core subjects

ACC	2019		2021		2022	
	No.	%	No.	%	No.	%
Principles of auditing and ethics in accounting	2459	66.5	3205	87.16	3529	90.63
Monitoring inventory system and costing	1357	36.72	3317	90.21	3801	97.56
Principles of economics	1962	53.08	3039	82.65	3755	96.43
Financial accounting	1108	29.98	3115	84.72	3829	98.33
Taxation	1112	30.09	3029	82.38	3812	97.89
Credit management and creditors account	849	22.97	2761	75.09	3651	93.76
Practical ACC	3658	98.97	3654	99.35	3892	99.92

According to table 51 it can be seen that pass rates in all subjects have increased over the past three years. The pass rates in 2019 were generally low, with Principles of auditing and ethics in accounting having the highest pass percentage at 66.5%. The pass rates for all topics, however, dramatically increased in 2021 and 2022, with many of them above 90%.

Principles of auditing and ethics in accounting had the highest pass rate in all three years, with a significant improvement from 66.5% in 2019 to 90.63% in 2022. This suggests that students have a better understanding of auditing and ethics in accounting, which could be due to better teaching methods, increased study materials or better student engagement.

Monitoring inventory system and costing had the second-highest pass rate in all three years, with an improvement from 36.72% in 2019 to 97.56% in 2022. This indicates that students have a better grasp of inventory management and costing concepts, which could be attributed to improved teaching methods and more comprehensive study materials.

Principles of economics, financial accounting, and taxation had a similar improvement trend, with pass rates increasing significantly in 2021 and 2022. Credit management and creditors account had a slightly lower pass rate than the other topics but still showed a significant improvement from 22.97% in 2019 to 93.76% in 2022.

Practical ACC had a pass rate of almost 100% in all three years, indicating that students have a good grasp of practical accounting concepts, which could be due to the hands-on nature of the course.

Table 52: Pass rate by Gender in Accounting trade

ACC	Gender	2019		2021		2022	
		No.	%	No.	%	No.	%
Principles of auditing and ethics in accounting	Female	2051	65.1	2656	85.4	2931	90.1
	Male	408	74.6	564	91.0	598	93.6
Monitoring inventory system and costing	Female	1117	35.5	2788	89.6	3172	97.5
	Male	240	43.9	567	91.5	629	98.1
Principles of economics	Female	1604	50.9	2514	80.8	3129	96.1
	Male	358	65.4	560	90.3	626	98.0
Financial accounting	Female	882	28.0	2591	83.3	3204	98.4
	Male	226	41.3	556	89.7	625	97.8
Taxation	Female	857	27.2	2523	81.1	3177	97.6
	Male	255	46.6	546	88.1	635	99.4
Credit management and creditors account	Female	658	20.9	2263	72.7	3030	93.1
	Male	191	34.9	620	82.7	621	97.2
Practical ACC	Female	3121	99.1	3088	99.3	3255	99.9
	Male	537	98.2	615	99.2	637	99.8

Table 52 shows the performance trend of male and female students in different accounting courses over the years 2019, 2021, and 2022. In the course “Principles of auditing and ethics in accounting,” both male and female students showed an improvement in performance over time. However, male students consistently outperformed their female counterparts in all three years, with a particularly significant increase in pass percentage between 2019 and 2021. In “Monitoring inventory system and costing,” both male and female students improved their pass rates over the years. The gender gap in pass rates also widened over time, with female students reaching a pass rate of 97.5% in 2022 compared to male students’ 98.1%. Similarly, in “Principles of economics,” there was a significant increase in pass percentage between 2019 and 2021. In this course, the gender gap in pass rates also widened over time. In “Financial accounting” and “Taxation,” female students consistently had lower pass rates than male students in 2019. However, female students showed a significant improvement in pass rates over time and surpassed male students in 2022. In “Credit management and creditors account,” female students consistently had lower pass rates than male students in all three years. However, both male and female students showed improvement in performance over time. In “Practical ACC,” both male and female students consistently had high pass rates, with female students consistently having a slightly higher pass rate than male students.

Table 53: Average score, SD and Variation Coefficient in ACC trade

ACC		2019	2021	2022
Principles of auditing and ethics in accounting	Mean	49.34	61.92	49.23
	SD	20.18	18.50	21.55
	VC	40.91	29.88	43.77
Monitoring inventory system and costing	Mean	34.93	65.14	64.91
	SD	19.37	17.80	21.11
	VC	55.46	27.33	32.52
Principles of economics	Mean	43.54	45.32	57.67
	SD	21.92	19.50	21.43
	VC	50.35	43.02	37.17
Financial accounting	Mean	31.82	54.70	63.65
	SD	16.59	22.00	19.01
	VC	52.14	40.21	29.87
Taxation	Mean	30.96	51.30	69.33
	SD	16.98	20.49	21.11
	VC	54.86	39.93	30.44
Credit management and creditors account	Mean	26.94	46.93	54.82
	SD	17.73	21.94	23.25
	VC	65.80	46.75	42.41
Practical ACC	Mean	95.59	95.64	94.40
	SD	5.84	4.73	5.05
	VC	6.11	4.94	5.35

Table 53 shows trend in the VC for each course over the different years: Principles of auditing and ethics in accounting: The VC increased from 40.9 in 2019 to 43.77 in 2022, indicating a higher level of variability in grades in the later years. Monitoring inventory system and costing: The VC decreased from 55.46 in 2019 to 27.33 in 2021, indicating a reduction in the variability of in the later years. Principles of economics: The VC decreased from 50.35 in 2019 to 37.17 in 2022, indicating a reduction in the variability of grades in the later years. Financial accounting: The VC decreased from 52.14 in 2019 to 29.87 in 2022, indicating a reduction in the variability of grades in the later years. Taxation: The VC decreased from 54.86 in 2019 to 30.44 in 2022, indicating a reduction in the variability of grades in the later years. Credit management and creditors account: The VC decreased from 65.80% in 2019 to 42.41% in 2022, indicating a reduction in the variability of grades in the later years. Practical ACC: The VC remained relatively stable over the years,

ranging from 6.11% to 5.35%, indicating consistency in performance of students in this course. Mean consistently increased over the three years 2019, 2021 and 2022, except in some course like Principles of auditing and ethics in accounting and Monitoring inventory system and costing where it dropped a slightly. Overall, there was a trend of decreasing VC for most courses, indicating that the performance of students in these courses became less variable over time. However, there was an increase in VC for the Principles of auditing and ethics in accounting course, indicating that the variability of grades increased over time in this course.

Table 54: Pass rate in ACC trade by school ownership

ACC	School type	2019		2021		2022	
		No.	%	No.	%	No.	%
Principles of auditing and ethics in accounting	GA	611	88.55	485	96.4	370	99.73
	PR	1223	59.8	1700	86.9	1737	95.28
	PU	494	94.1	690	98.4	838	89.15
Monitoring inventory system and costing	GA	445	64.5	494	98.2	371	100
	PR	481	23.5	1776	90.8	1805	99.01
	PU	386	73.52	694	99	915	97.24
Principles of economics	GA	543	78.70	488	97	371	100
	PR	804	39.33	1482	75.7	1759	96.49
	PU	480	91.43	695	99.1	922	98.09
Financial accounting	GA	408	59.13	498	99	371	100
	PR	341	16.68	1613	82.4	1811	99.34
	PU	335	63.81	692	98.7	919	97.77
Taxation	GA	406	58.84	491	97.6	371	100
	PR	330	16.14	1543	78.8	1804	98.96
	PU	342	65.14	689	98.3	918	97.66
Credit management and creditors account	GA	318	46.09	488	97	371	100
	PR	215	10.52	1332	68.1	1765	96.82
	PU	290	55.24	676	96.4	871	92.66
Practical ACC	GA	689	99.86	503	100	371	100
	PR	2028	99.22	1948	99.5	1822	99.95
	PU	525	100	700	99.9	939	99.89

Looking at the data related to Principles of auditing and ethics in accounting, in 2019, 88.55% of GA candidates passed this exam, which increased to 96.4% in 2021 and further increased to 99.73% in 2022. Similarly, the pass rate of PR and PU candidates also increased over the years. Regarding monitoring inventory system and costing, in 2019, the pass rate for GA candidates was 64.5%, which increased significantly to 98.2% in 2021 and became 100% in 2022. For PR candidates, the pass percentage increased from 23.5% in 2019 to 90.8% in 2021 and further to 99.01% in 2022. PU candidates also showed improvement in pass rate over the years. As per Principles of economics in 2019, GA candidates had a pass rate of 78.70%, which increased to 97% in 2021 and became 100% in 2022. For PR candidates, the pass percentage increased from 39.33% in 2019 to 75.7% in 2021 and further to 96.49% in 2022. PU candidates also showed improvement in pass rate over the years. Regarding Financial accounting in 2019, GA candidates had a pass rate of 59.13%, which increased to 99% in 2021 and became 100% in 2022. For PR candidates, the pass rate increased from 16.68% in 2019 to 82.4% in 2021 and further to 99.34% in 2022. PU candidates also showed improvement in pass rate over the years. For taxation in 2019, GA candidates had a pass rate of 58.84%, which increased to 97.6% in 2021 and remained 100% in 2022. For PR candidates, the pass rate increased from 16.14% in 2019 to 78.8% in 2021 and further to 98.96% in 2022. PU candidates also showed improvement in pass percentage over the years. As per Credit management and creditors account, in 2019, GA candidates had a pass percentage of 46.09%, which increased significantly to 97% in 2021 and amounted to 100% in 2022. For PR candidates, the pass percentage increased from 10.52% in 2019 to 68.1% in 2021 and further to 96.82% in 2022. PU candidates also showed improvement in pass rate over the years. Regarding Practical ACC, all the candidates who appeared for the exam in the three years passed with a high percentage. For GA and PU candidates, the pass rate was consistently 100% in all three years. However, for PR candidates, the pass percentage decreased slightly from 100% in 2019 and 99.9% in 2021 and further to 99.89% in 2022. Overall, we can conclude that the pass rate of candidates improved significantly over the three years in most of the accounting subjects.

3.5.2. Auto Electricity and Electronics Systems (AES)

Table 55 shows the total number of students who attended National Examinations in the trade of Auto Electricity and Electronics Systems across three years, for 2019, 2021 and 2022.

Table 55: Number of students that attended the trade of Auto Electricity and Electronics Systems

Subjects	2019	2021	2022
Automotive electrical starting and charging system	357	536	507
Automotive engine and auxiliaries systems	357	536	507
Automotive engine ignition and powering	357	536	507
Practical AES	357	536	506
Vehicle drive assistance and electronic system	357	536	507
Vehicle electronics stability and signaling system	357	536	507

As indicated in the table above, in 2019, the total number of students who attended each subject within trade was 357. However, in 2021, the total number of students increased to 536 for all subjects. Then, in 2022, there was a slight decrease in the total number of students for each subject.

Overall, the trade of Auto Electricity and Electronics Systems seems to have gained popularity among students, with a significant increase in the total number of students attending trade in 2021 compared to 2019. However, the declining number of students taking Auto Electricity and Electronics Systems in 2022 calls for further research to find out the reason behind.

Table 56: Pass rate in Auto Electricity and Electronics Systems (AES) trade Core subjects

AES	2019		2021		2022	
	No.	%	No.	%	No.	%
Automotive electrical starting and charging system	304	85.2	497	92.7	506	99.8
Vehicle drive assistance and electronic system	298	83.47	477	89.0	504	99.41
Automotive engine and auxiliaries systems	302	84.59	390	72.8	494	97.44
Vehicle electronics stability and signaling system	315	88.24	485	90.5	502	99.01
Automotive engine ignition and powering	349	97.76	442	82.5	502	99.01
Practical AES	356	99.72	530	98.9	507	100

From the table above, it is clear that there was a significant increase in performance from 2019 to 2021, with a further slight increase in 2022. This category saw a 7.5% increase in pass rate from 2019 to 2021, and then a 7.1% increase from 2021 to 2022. The “Vehicle drive assistance and electronic system” category also had a similar increase in performance from 2019 to 2021, with a 5.53% increase in pass rate, and

a further increase of 10.41% from 2021 to 2022. However, the “Automotive engine and auxiliaries’ systems” category had a decrease in performance for 2019 to 2021, with a 11.79% decrease in pass rate, but then a significant improvement of 24.64% from 2021 to 2022. The “Vehicle electronics stability and signaling system” category also saw a consistent increase in performance from 2019 to 2022, with a 2.26% increase from 2019 to 2021, and a further increase of 8.44% from 2021 to 2022. The “Automotive engine ignition and powering” category had the highest pass percentage in 2019, with a pass percentage of 97.76%. However, this subject had a decrease in performance in 2021, with a 15.26% decrease in pass rate. But it improved in 2022, with a significant increase of 16.51% in pass percentage. Finally, the “Practical AES” category had a consistently high pass rate in all the years, with a pass rate of 99.72%, 98.9%, and 100% for 2019, 2021, and 2022 respectively. Overall, the performance trend for AES trade varies significantly among different categories in different years. While some categories showed consistent improvement in performance, others showed fluctuations in their pass rates.

Table 57: Pass rate in Auto Electricity and Electronics Systems (AES) Trade by Gender

AES	Gender	2019		2021		2022	
		No.	%	No.	%	No.	%
Automotive electrical starting and charging system	Female	31	91.2	62	92.5	39	97.5
	Male	273	84.5	419	93.5	467	100
Vehicle drive assistance and electronic system	Female	32	94.1	63	94.0	40	100
	Male	266	82.4	400	89.3	464	99.36
Automotive engine and auxiliaries systems	Female	30	88.2	49	73.1	38	95
	Male	272	84.2	330	73.7	456	97.64
Vehicle electronics stability and signaling system	Female	31	91.2	59	88.1	40	100
	Male	284	87.9	408	91.1	462	98.93
Automotive engine ignition and powering	Female	34	100.0	57	85.1	40	100
	Male	315	97.5	367	81.9	462	98.93
Practical AES	Female	34	100.0	66	98.5	40	100
	Male	322	99.7	443	98.9	466	100

As seen in the above table, there is an increase in pass rate for both male and female candidates for 2019 and 2021, and 100% for male candidates in 2022. However, the pass rate for female candidates increased consistently from 91.2% in 2019, then 92.5% in 2021 to 97.5% in 2022. For Vehicle Drive Assistance and Electronic System, there was an increase in pass rate for both male and female candidates for 2019 ,2002, but a slight decrease for female candidates in 2021. The pass rate percentage for female candidates remained consistent around 94% throughout 2019 and 2021. For Automotive Engine and Auxiliaries Systems,

there was a decrease in pass rate for both male and female candidates for 2019 and 2021, and then an increase in 2022. The pass rate for female candidates decreased from 88.2% in 2019 to 73.1% in 2021, but then increased to 95% in 2022. For male candidates, the pass rate percentage decreased from 84.2% in 2019 to 73.7% in 2021, but then increased to 97.64% in 2022. For Vehicle Electronics Stability and Signaling System, there was an increase for male pass rate and a decrease for female pass rate candidates for 2019 and 2021, and then a slight increase for male candidates in 2022. The pass rate for female candidates amounted to 100% in 2022. Regarding Automotive Engine Ignition, Powering and Practical AES, the pass rate for both male and female candidates remained consistently high throughout the years, with some slight fluctuations for male candidates. Overall, there was a consistent trend of high pass rate percentages for both male and female candidates in AES trade, with some slight fluctuations in certain trade areas and years.

Table 58: Average score, SD and VC of scores in Auto Electricity and Electronics Systems trade

AES	Gender	2019	2021	2022
Automotive electrical starting and charging system	Mean	58.00	40.40	79.40
	SD	17.09	20.11	14.13
	VC	29.47	49.78	17.79
Vehicle drive assistance and electronic system	Mean	56.50	38.25	80.58
	SD	16.57	20.69	15.70
	VC	29.33	54.07	19.48
Automotive engine and auxiliaries systems	Mean	56.38	19.40	64.87
	SD	15.82	23.71	19.41
	VC	28.06	122.24	29.92
Vehicle electronics stability and signaling system	Mean	64.23	23.22	79.20
	SD	19.30	21.11	16.03
	VC	30.05	90.89	20.24
Automotive engine ignition and powering	Mean	72.76	22.17	78.69
	SD	13.48	24.97	16.25
	VC	18.52	112.62	20.65
Practical AES	Mean	92.32	25.83	92.80
	SD	6.11	23.16	4.06
	VC	6.62	89.66	4.37

Table 58 shows the mean, standard deviation, and variation coefficient (VC) of different subjects of Automotive Electricity and Electronics Systems (AES) trade for the years 2019, 2021, and 2022. For the AES related to automotive electrical starting and charging system, its observed on the table that the mean was 58.00 in 2019, decreased to 40.40 in 2021 but increased tremendously to 79.40 in 2022. The standard deviation was 17.09 in 2019, 20.11 in 2021 and 14.13 in 2022. The variation coefficient decreased from 29.47 in 2019, to 49.78 in 2021 and 17.79 in 2022. This indicates that the data became less variable in the later years, and the values were closer to the mean. Similarly, for the AES related to vehicle drive assistance and electronic system, the mean decreased from 56.50 in 2019 to 38.25 in 2021 and after increased significantly to 80.58 in 2022. The standard deviation also increased from 16.57 in 2019 to 20.69 in 2021 and after went down to 15.70 in 2022. However, the variation coefficient increased from 29.33 in 2019 to 54.07 in 2021 and decreased to 19.48 in 2022. This suggests that the variability of the student scores increased, but not as much as the mean. For the AES related to automotive engine and auxiliaries systems, the mean decreased from 56.38 in 2019 to 19.40 in 2021 and in 2022 went up to 64.87. The standard deviation increased from 15.82 in 2019 to 23.71 in 2021 and a slight decrease to 19.41 in 2022. The variation coefficient increased significantly from 28.06 in 2019 to 122.24 in 2021 before going down to 29.92 in 2022. This indicates that the student scores became more variable in the later years, and the values were further from the mean. For the AES related to vehicle electronics stability and signaling system, the mean decreased from 64.23 in 2019 to 23.22 in 2021 and increased up to 79.20 in 2022. The standard deviation slightly increased from 19.30 in 2019 to 21.11 in 2021 and decreased to 16.03 in 2022. The variation coefficient increased from 30.05 in 2019 to 90.89 in 2021 and decreased significantly back to 20.24 in 2022. This suggests that the student scores became less variable in the later years, and the values were closer to the mean. For the AES related to automotive engine ignition and powering, the mean decreased from 72.76 in 2019 to 22.17 in 2021 and increased in 2022 to 78.69. The standard deviation increased from 13.48 in 2019 to 24.97 in 2021 and decreased to 16.25 in 2022. The variation coefficient increased significantly from 18.52 in 2019 to 112.62 in 2021 before going down to 20.65 in 2022. This indicates that the student scores became more variable in 2021, and the values were further from the mean. Finally, for the AES related to practical AES, the mean decreased significantly from 92.32 in 2019 to 25.83 in 2021 and went back up to 92.80 in 2022. The standard deviation increased from 6.11 in 2019 to 23.16 in 2021 and decreased to 4.06 in 2022. The variation coefficient increased significantly from 6.62 in 2019 to 89.66 in 2021 and went back down to 4.37 in 2022. This suggests that the student scores became more variable in 2019. Overall, it appears that there is some variability in the AES trade pass rate data over the three years, with some AES subjects having higher mean values or more variability than others. However, without further context or analysis, it is difficult to draw any conclusions about the causes or implications of these variations.

Table 59: Pass rate in Auto Electricity and Electronics Systems trade by school ownership

AES	School type	2019		2021		2022	
		No.	%	No.	%	No.	%
Automotive electrical starting and charging system	GA			52	94.5	33	100
	PR	188	83.6	292	93	319	99.69
	PU	115	87.8	137	94.5	152	100
Vehicle drive assistance and electronic system	GA			51	92.7	33	100
	PR	178	79.1	280	89.2	317	99.06
	PU	119	90.84	132	91	152	100
Automotive engine and auxiliaries systems	GA			47	85.5	33	100
	PR	184	81.78	218	69.4	308	96.25
	PU	117	89.31	114	78.6	152	100
Vehicle electronics stability and signaling system	GA			53	96.4	33	100
	PR	195	86.67	279	88.9	316	98.75
	PU	119	90.84	135	93.1	152	100
Automotive engine ignition and powering	GA			44	80	33	100
	PR	220	97.78	252	80.3	315	98.44
	PU	128	97.71	128	88.3	152	100
Practical AES	GA			53	96.4	33	100
	PR	224	99.56	313	99.7	320	100
	PU	131	100	143	98.6	152	100

In general, the pass rates for all AES subjects in different school ownership categories improved for 2019 to 2021 and 2022. For example, the pass rate for Automotive electrical starting and charging system in GA category improved from 94.5% in 2021 to 100% in 2022. Similarly, the pass rate for Vehicle drive assistance and electronic system in PR category improved from 79.1% in 2019 to 89.2% in 2021 and 99.06% in 2022. It is also interesting to note that in most cases, the pass rates for the PU ownership category were higher than those for the GA and PR categories. For example, the pass rate for Automotive engine ignition and powering PU category was 88.3% in 2021 compared to 80.3% in GA category and 80% in PR category. The highest pass rates across all ownership categories and subjects were observed in the Practical AES, with 100% pass rates in all ownership categories and years.

Overall, the table shows that there has been an improvement in pass rates for AES subjects over the years, and that PU ownership category generally has higher pass rates compared to GA and PR categories.

3.5.3. Pass rate and performance in Animal Health (ANH) Trade

Table shows the total number of students who sat for trade of Animal Health (ANH) National Examinations across three academic years: 2019, 2021, and 2022

Table 60: Total number of students registered for exam in the trade of Animal Health

Subjects	2019	2021	2022
Anatomy physiology and artificial insemination	709	789	593
Animal diseases prevention and control	709	789	593
Animal product control, extension and ethics	709	789	593
Fish farming and beekeeping	709	789	593
Non-ruminant farming	709	789	593
Organic and inorganic chemistry	709	789	593
Practical ANH	709	789	593
Ruminant farming and animal feeding	709	789	593
Surgery and veterinary interventions	709	789	593

The trade of Animal Health includes various subjects that cover different aspects of animal health, farming, and management. Each row in the table corresponds to a subject taught in the ANH trade, and each column shows the total number of students who attended that subject in a particular academic year.

The total number of students who did ANH trade exams remained constant in each year across the three academic years, with 709 students in each subject in 2019, 789 students in in 2021, and 593 students in 2022. It is worth noting that while the total number of students attending each subject was the same each academic year, there was an increase in total number of students for example, for 2019 they were 709 and in 2021 the number increased to 789 . However, there was a decrease in the total of candidates in 2022 to 593. Overall, the table suggests that the ANH trade attendance among students is decreasing and there is a need to find out the underlying reason behind the decreasing number.

Table 61: Pass rate trend in Animal Health (ANH) trade in Core subjects

ANH	2019		2021		2022	
	No.	%	No.	%	No.	%
Animal product control, extension and ethics	498	70.2	666	84.4	563	94.94
Fish farming and beekeeping	531	74.89	700	88.7	566	95.45
Ruminant farming and animal feeding	575	81.10	722	91.5	570	96.12
Surgery and veterinary interventions	695	98.03	760	96.3	584	98.48
Organic and inorganic chemistry	674	95.06	727	92.1	559	94.27
Anatomy physiology and artificial insemination	654	92.24	703	89.1	571	96.29
Animal diseases prevention and control	493	69.53	653	82.8	565	95.28
Non-ruminant farming	562	79.27	722	91.5	585	98.65
Practical ANH	707	99.72	788	99.9	593	100

Table 61 shows performance trend in frequency and percentage of different subjects for Animal Health trade in three years 2019, 2021, and 2022. Overall, there is an improvement in the performance of Animal Health trade for 2019, 2021 and 2022 respectively. The data in the table shows that that pass rate in all subjects increased, indicating a good progress in the pass rate of different subjects of Animal Health trade. Comparing the pass rate for the examinable subjects for example, the highest Pass rate among all subjects was Practical ANH, with 99.72%, 99.9%, and 100% Pass rate in 2019, 2021, and 2022, respectively. Animal product control, extension, and ethics also showed significant improvement, with Pass percentage increasing from 70.2% in 2019 to 84.4% in 2021 and further to 94.94% in 2022. Similarly, Fish farming and beekeeping, Ruminant farming and animal feeding, and non-ruminant farming subjects also showed an upward trend in the percentage of Pass from 2019 to 2022. However, the Pass rate in Anatomy physiology and artificial insemination and Surgery and veterinary interventions subjects decreased in 2021 but showed improvement in 2022. Overall, the data shows a positive trend in the pas rate of students of Animal Health trade in different subjects, with some subjects showing better improvement than others.

Table 62: Pass rate in Animal Health trade by Gender

ANH		2019		2021		2022	
		No.	%	No.	%	No.	%
Animal product control, extension and ethics	Female	271	64.07	298	76.020	300	92.02
	Male	227	79.37	368	92.695	263	98.5
Fish farming and beekeeping	Female	277	65.48	331	84.439	304	93.25
	Male	254	88.81	369	92.947	262	98.13
Ruminant farming and animal feeding	Female	321	75.89	338	86.224	306	93.87
	Male	254	88.81	384	96.725	264	98.88
Surgery and veterinary interventions	Female	412	97.40	369	94.133	319	97.85
	Male	283	98.95	391	98.489	265	99.25
Organic and inorganic chemistry	Female	397	93.85	357	91.071	300	92.02
	Male	277	96.85	370	93.199	259	97
Anatomy physiology and artificial insemination	Female	379	89.60	333	84.949	311	95.5
	Male	275	96.15	370	93.199	260	97.38
Animal diseases prevention and control	Female	259	61.23	292	74.490	305	93.56
	Male	234	81.82	361	90.932	260	97.38
Non-ruminant farming	Female	312	73.76	335	85.459	320	98.16
	Male	250	87.41	387	97.481	265	99.25
Practical ANH	Female	423	100.00	391	99.745	326	100
	Male	284	99.30	397	100.00	267	100

As seen in the above table, the subject with the largest gender gaps in pass rate is Fish farming and beekeeping where female performance was 65.48% and male 88.81% in 2019, Ruminant farming and animal feeding in 2019 female performance was 75.89% and male 88.81%, and non-ruminant farming in 2019 female performance was 73.76% and male 87.41%. In these subjects, male students consistently outperformed female students by a significant margin. The subject with the smallest gender gap in pass rate is Practical ANH, where both male and female students had a very high pass rate percentage, and the difference between the two genders was 0.7%. In general, there seems to be an improvement in pass rate percentage for both male and female students in most subjects between the first and the second year, and a slight increase in the third year. However, it's worth noting that the pass rate percentage for male students in some subjects (such as Surgery and veterinary interventions and non-ruminant farming) remained consistently high over all three years. Overall, the data suggests that there is a gender gap in pass rate percentage in most subjects of the Animal Health trade, with male students consistently performing better than female students.

Table 63: Average score, SD and CV of scores in Animal Health trade

ANH		2019	2021	2022
Animal product control, extension, and ethics	Mean	46.85	48.36	44.31
	SD	13.85	13.52	15.20
	VC	29.56	27.96	34.31
Fish farming and beekeeping	Mean	50.19	64.39	54.55
	SD	15.32	17.89	18.67
	VC	30.53	27.79	34.22
Ruminant farming and animal feeding	Mean	52.54	59.72	53.71
	SD	14.55	13.87	17.28
	VC	27.69	23.23	32.17
Surgery and veterinary interventions	Mean	79.44	76.88	59.82
	SD	12.59	13.15	17.66
	VC	15.85	17.10	29.52
Organic and inorganic chemistry	Mean	54.78	74.89	53.65
	SD	15.39	15.20	19.38
	VC	28.09	20.30	36.13
Anatomy physiology and artificial insemination	Mean	63.07	63.05	56.96
	SD	15.23	18.20	17.09
	VC	24.14	28.86	30.00
Animal diseases prevention and control	Mean	47.81	48.51	51.73
	SD	15.18	14.66	17.97
	VC	31.74	30.23	34.74
Non-ruminant farming	Mean	53.00	58.79	59.56
	SD	15.65	13.32	14.54
	VC	29.53	22.65	24.41
Practical ANH	Mean	94.43	94.18	92.62
	SD	4.18	3.65	4.05
	VC	4.42	3.88	4.37

Table 63 provides the mean, standard deviation, and coefficient of variation (CV) of various subjects of Animal Health (ANH) trade across three years. Looking at the table, we can say that the mean values for the different subjects of animal health trade vary across the three years. For example, in the Animal product control, extension, and ethics category, the mean values decrease from 46.85 in

2019 to 44.31 in 2022. In contrast, the mean values for Fish farming and beekeeping category increase from 50.19 in 2019 to 64.39 in 2021, before dropping to 54.55 in 2022. The standard deviation (SD) values also vary across the different subjects of animal health trade in three years. For example, the SD values for Surgery and veterinary interventions increase from 12.59 in 2019 to 17.66 in 2022, while the SD values for non-ruminant farming decreased from 15.65 in 2019 to 14.54 in 2022. The variation coefficient (VC) values also vary across the different subjects of animal health trade in three years. For example, the VC values for Organic and inorganic chemistry increase from 28.09 in 2019 to 36.13 in 2022, while the VC values for Practical ANH remain relatively stable across the three years. In conclusion, the mean, standard deviation, and variation of coefficient values in animal health trade vary across the different subjects and years. It is important to consider these variations when analyzing trends and making decisions in the animal health trade.

Table 64: Pass rate in Animal Health trade by school ownership

ANH		2019		2021		2022	
		No.	%	No.	%	No.	%
Animal product control, extension and ethics	GA	149	65.35	183	85.5	184	98.4
	PR	45	50.0	64	68.8	78	89.66
	PU	303	77.7	417	87.1	297	97.06
Fish farming and beekeeping	GA	193	84.7	195	91.1	184	98.4
	PR	36	40.0	48	51.6	82	94.25
	PU	301	77.18	455	95	296	96.73
Ruminant farming and animal feeding	GA	187	82.02	193	90.2	185	98.93
	PR	54	60.00	73	78.5	82	94.25
	PU	333	85.38	454	94.8	298	97.39
Surgery and veterinary interventions	GA	225	98.68	201	93.9	187	100
	PR	83	92.22	85	91.4	85	97.7
	PU	386	98.97	472	98.5	303	99.02
Organic and inorganic chemistry	GA	212	92.98	201	93.9	186	99.47
	PR	78	86.67	72	77.4	69	79.31
	PU	383	98.21	453	94.6	300	98.04
Anatomy physiology and artificial insemination	GA	217	95.18	185	86.4	187	100
	PR	66	73.33	74	79.6	83	95.4
	PU	370	94.87	443	92.5	297	97.06

Animal diseases prevention and control	GA	172	75.44	172	80.4	186	99.47
	PR	39	43.33	47	50.5	76	87.36
	PU	282	72.31	434	90.6	298	97.39
Non-ruminant farming	GA	172	75.44	198	92.5	187	100
	PR	44	48.89	69	74.2	85	97.7
	PU	346	88.72	453	94.6	304	99.35
Practical ANH	GA	227	99.56	213	99.5	187	100
	PR	90	100	93	100	87	100
	PU	389	99.74	479	100	306	100

From the above table, it is evident that the pass rate percentage is high across all ownership categories in ANH subjects. In 2019, the pass rate percentage ranges from 40% to 100%, while in 2021 and 2022, it ranges from 51.6% to 100%. Looking at the ANH subjects, we can see that in 2019, the lowest pass rate percentage was for animal diseases prevention and control 72.31% in the PU ownership category, while the highest was for practical ANH 100% in the PR ownership category. In 2021 and 2022, the lowest pass rate percentage was for Fish farming and beekeeping 51.6% in the PR ownership category, while the highest was for practical ANH 100% in all ownership categories. Overall, the pass rate percentage seems to have increased in most cases from 2019 to 2021 and 2022, which could indicate improvements in the ANH training and education.

3.5.4 Performance and pass rate in Graphics Arts (ART) trade

Table 65 below shows the total number of students who attended the trade of Graphics Arts (ART) National Exams across three years, from 2019 till 2022, in six different subjects.

Table 65: Total number of registered students in the trade of Graphics Arts

Subjects	2019	2021	2022
Artistic drawing	35	71	54
Computer skills C	35	71	54
History of art and aesthetics	35	71	54
Practical ART	35	71	54
Printing	35	71	54
Sketch	35	71	54

According to the above table, in 2019, there were 35 students who attended each of the six subjects in ART, making the total number of students in ART 210. In the next two academic years the 2022), the total number of students in GRA

remained constant at 426, with 71 students attending each of the six subjects in 2021 and 324 with 54 students attending each of the six subjects in 2022. However, there were variations in the number of students attending each individual subject across three years. In 2021, there was a significant increase in the number of students attending each subject, doubling from 35 in 2019 to 71 in 2021. However, in the subsequent academic year (2022), the number of students attending each subject dropped back to 54. Overall, the table suggests that there was a surge in interest in the trade of Graphics Arts between 2019 and 2021, with a doubling in the number of students attending each subject. However, this surge was not sustained in the following academic year, as the number of students attending each subject dropped to 54. The reasons behind the above fluctuation may be the school capacity to accommodate the students, the interest of students, the job market and any other factors that may be found through further research.

Table 66: Pass rate trend in ART trade in Core subjects

ART	2019		2021		2022	
	No.	%	No.	%	No.	%
History of art and aesthetics	34	97.1	71	100	54	100
Sketch	35	100.00	71	100	54	100
Artistic drawing	34	97.14	71	100	54	100
Computer skills C	35	100	71	100	54	100
Printing	33	94.29	71	100	54	100
Practical ART	35	100	71	100	54	100

Based on the data in Table 66, we can observe the following trends in the trade of art in different years. History of art and aesthetics, artistic drawing, and printing all had a percentage frequency below 100 % in 2019 compared to 2021 and 2022 which had a percentage of 100%. Sketch and computer skills C remained constant with 100% frequency in all three years. Practical art had a steady 100% frequency in all three years. Overall, there was a low percentage in some subjects in 2019, but the majority remained consistent across all three years, we can also notice that students in the trade of art perform at a high level in all subjects.

Table 67: Pass rate in ART by Gender

ART		2019		2021		2022	
		No.	%	No.	%	No.	%
History of art and aesthetics	Female	8	100	21	100	15	100
	Male	26	96.3	50	100	39	100
Sketch	Female	8	100.0	21	100	15	100
	Male	27	100.00	50	100	39	100
Artistic drawing	Female	7	87.50	21	100	15	100
	Male	27	100.00	50	100	39	100
Computer skills C	Female	8	100.00	21	100	15	100
	Male	27	100	50	100	39	100
Printing	Female	7	87.5	21	100	15	100
	Male	26	96.29	50	100	39	100
Practical ART	Female	8	100	21	100	15	100
	Male	27	100	50	100	39	100

From table 67, it can be inferred that the pass rates for both male and female students are very high in all the subjects of Art, and there are no significant differences between the pass rates for male and female students.

In 2019, the pass rate for female students was 100% in all the subjects of Art except in Artistic drawing and printing both have (87.5%), and the pass rate for male students was slightly lower in History of art and aesthetics (96.3%) and in Printing (96.29%). In 2021 and 2022, the pass rates for both male and female students were 100% in all the subjects of Art. Therefore, it can be concluded that there is no significant difference in the pass rates between male and female students in the Art's subjects in the years 2019, 2021, and 2022.

Table 68: Average score, SD and CV of scores in ART trade

ART		2019	2021	2022
History of art and aesthetics	Mean	72.43	79.86	81.17
	SD	14.65	11.61	11.40
	VC	20.23	14.53	14.05
Sketch	Mean	79.20	72.97	81.31
	SD	11.21	12.65	8.62
	VC	14.16	17.33	10.60
Artistic drawing	Mean	79.63	66.86	77.37
	SD	12.27	11.77	11.35
	VC	15.41	17.60	14.68
Computer skills C	Mean	78.11	76.49	63.11
	SD	9.46	10.61	11.94
	VC	12.11	13.87	18.92
Printing	Mean	66.86	85.30	79.28
	SD	14.39	7.37	7.31
	VC	21.52	8.64	9.23
Practical ART	Mean	83.83	86.03	86.24
	SD	9.81	7.41	4.33
	VC	11.70	8.61	5.03

Table 68 shows that the mean score increased from 72.43 in 2019 to 81.17 in 2022. The standard deviation decreased from 14.65 in 2019 to 11.40 in 2022, indicating that the data points are less spread out from the mean in the later period. The variation coefficient also decreased from 20.23 in 2019 to 14.05 in 2022, indicating a decrease in variability relative to the mean in the later period.

Regarding “Sketch,” subject the mean value fluctuated over time, from 79.20 in 2019 to 72.97 in 2021, and then back up to 81.31 in 2022. The standard deviation also varied over time, from 11.21 in 2019 to 12.65 in 2021 and then down to 8.62 in 2022. The variation coefficient increased from 14.16 in 2019 to 17.33 in 2021 and then decreased to 10.60 in 2022. For the subject “Artistic drawing,” the mean value decreased from 79.63 in 2019 to 66.86 in 2021 and then increased to 77.37 in 2022. The standard deviation varied over time, from 12.27 in 2019 to 11.77 in 2021 and then down to 11.35 in 2022. The variation coefficient increased from 15.41 in 2019 to 17.60 in 2021 and then decreased to 14.68 in 2022. For the subject “Computer skills C,” the mean value fluctuated over time, from 78.11 in 2019 to 76.49 in 2021 and then down to 63.11 in 2022. The standard deviation increased from 9.46 in 2019 to 10.61

in 2021 and then up to 11.94 in 2022. The variation coefficient increased from 12.11 in 2019 to 13.87 in 2021 and then up to 18.92 in 2022. For the subject "Printing," the mean value increased from 66.86 in 2019 to 85.30 in 2021 and then down to 79.28 in 2022. The standard deviation decreased from 14.39 in 2019 to 7.37 in 2021 and then slight change to 7.31 in 2022. The variation coefficient decreased from 21.52 in 2019 to 8.64 in 2021 and then up to 9.23 in 2022. In Practical Art the mean value increased from 83.83 in 2019 to 86.24 in 2022. The standard deviation decreased from 9.81 in 2019 to 4.33 in 2022. The variation coefficient also decreased from 11.70 in 2019 to 5.03 in 2022, indicating a decrease in variability relative to the mean in the later period.

Table 69: Pass rate in ART trade by school ownership

ART Trade core subjects		2019		2021		2022	
		No.	%	No.	%	No.	%
History of art and aesthetics	GA	34	97.14	71	100	54	100
Sketch	GA	35	100.0	71	100	54	100
Artistic drawing	GA	34	97.1	71	100	54	100
Computer skills	GA	35	100.00	71	100	54	100
Printing	GA	33	94.29	71	100	54	100
Practical ART	GA	35	100.00	71	100	54	100

From Table 69, the following observations can be made: In 2019, all subjects had a pass rate of over 94%, with Sketch, Computer skills C, and Practical ART having a perfect pass rate of 100%. In the 2021 academic year, all subjects had a pass rate of 100%, as well as in the 2022 academic year, all subjects had a pass rate of 100%. History of art and aesthetics, Printing, Sketch, Artistic drawing, Computer skills C, and Practical ART maintained a perfect pass rate of 100% from 2021 to 2022 academic year. Overall, the pass rate percentage in Art trade by subject is consistently high across all subjects and years, with some subjects having a perfect pass rate of 100%. This indicates a high level of proficiency among students in the Art trade program and suggests that the program is well-designed and effectively implemented.

3.5.5 Automobile Transmission and Control Systems Technology (ATC) Trade

This section provides information on the total number of students who attended the trade of Automobile Transmission and Control Systems Technology (ATC) National Exams in the three academic years, general performance and pass rate, pass rate by gender and by school ownership.

Table 70: Total number of students registered in ATC trade

Subjects	2019	2021	2022
Automotive engine and auxiliaries systems	1279	1554	1762
Automotive hydraulic pump valves and actuators repairing	1279	1554	1763
Automotive steering suspension and hydraulic systems	1279	1554	1763
Automotive transmission system	1279	1554	1762
Pneumatic and air brake system maintenance	1279	1554	1763
Practical ATC	1279	1554	1764

The table presents the number of students who attended six different subjects under the ATC National Exams in each academic year. In 2019, the total number of students who attended each of the six subjects was 1279. This number increased in the academic year 2021, where 1554 students attended each of the six subjects. In the most recent academic year 2022, the number of students who attended each of the six subjects increased again, with the highest number of students attending Practical ATC with 1764 students. Across all three years, the number of students who attended each subject increased consistently.

Overall, the table indicates that the ATC National Exams is growing in popularity, with an increasing number of students attending the trade National Exams each year. It also suggests that Practical ATC is the most attended subject among the six, as it had the highest number of attendees in the latest academic year. The factors behind the popularity of ATC trade may be needed career at job market, useful skills that can be applied everywhere, and any other factors that may be found through research.

Table 71: Pass rate trend in ATC trade in Core subjects

ATC	2019		2021		2022	
	No.	%	No.	%	No.	%
Pneumatic and air brake system maintenance	1177	92.0	1229	79.1	1692	95.97
Automotive engine and auxiliaries systems	1070	83.66	1164	74.9	1690	95.91
Automotive steering suspension and hydraulic systems	1093	85.46	1319	84.9	1663	94.33
Automotive transmission system	794	62.08	1182	76.1	1709	96.99
Automotive hydraulic pump valves and actuators repairing	1179	92.18	1316	84.7	1730	98.13
Practical ATC	1274	99.61	1548	99.6	1763	99.94

The trend of pass rate in the above tables indicates that Pneumatic and air brake system maintenance has shown decrease in pass frequency from 2019 to 2021, with a percentage increase of 12.9% and a further increase of 16.87% in 2022. This indicates an improvement in the overall performance of students in this area. Automotive engine and auxiliaries systems had a pass frequency of 83.66% in 2019, which decreased to 74.9% in 2021, but then increased to 95.91% in 2022. This indicates that there was a low performance in 2021, but students improved their performance in the subsequent year. Automotive steering suspension and hydraulic systems had a consistent pass frequency of over 85% in 2019 and 2022, with a slight decrease in 2021 with 84.9% pass frequency in 2022. This indicates that students have consistently performed well in this area. Automotive transmission system showed a significant improvement in pass frequency from 2019 to 2022, with a percentage increase of 14.02% in 2021 and a further increase of 20.89% in 2022. This indicates a significant improvement in the overall performance of students in this area. Automotive hydraulic pump valves and actuators repairing had a pass frequency of over 90% in 2019 and 2022, with a slight decrease of 84.7% pass percentage in 2022. This indicates that students have consistently performed well in this area. Practical ATC had a pass frequency of over 99% in all three years, indicating that students have consistently performed well in practical aspects of ATC, however, the performance in practical ATC has been consistently high.

Table 72: Pass rate in ATC Trade by Gender

ATC		2019		2021		2022	
		No.	%	No.	%	No.	%
Pneumatic and air brake system maintenance	Female	57	91.94	62	79.49	77	95.06
	Male	1120	92.03	1167	79.07	1615	96.02
Automotive engine and auxiliaries systems	Female	49	79.03	60	76.92	75	92.59
	Male	1021	83.89	1104	74.80	1615	96.07
Automotive steering suspension and hydraulic systems	Female	56	90.32	66	84.62	71	87.65
	Male	1037	85.21	1253	84.89	1592	94.65
Automotive transmission system	Female	36	58.06	57	73.08	76	93.83
	Male	758	62.28	1125	76.22	1633	97.14
Automotive hydraulic pump valves and actuators repairing	Female	57	91.94	70	89.74	79	97.53
	Male	1122	92.19	1246	84.42	1651	98.16
Practical ATC	Female	61	98.39	78	100.00	81	100
	Male	1213	99.67	1470	99.59	1682	99.94

The data in the above table shows that in the year 2019 to 2021 there was a decrease in pass frequency for both male and female, 12.45% for female and 13.03% for male decrease in pass frequency is seen, however there is a remarkable increase performance in 2022 for both male and female, 15.57% for female and 16.95% male were achieved. Automotive engine and auxiliaries systems: both male and female students showed a decrease pass frequency in 2021, with male students showing a percentage decrease of 9.09% and female students showing a percentage decrease of 2.11%. In 2022, both male and female students showed an improvement in pass frequency, with female students showing a percentage increase of 15.67% and male students showing a percentage increase of 21.27%.

Automotive steering suspension and hydraulic systems: In this subject both male and female students showed a decrease in pass frequency in 2021, with male students showing a slight percentage decrease of 0.32% and female students showing a percentage decrease of 5.7%. In 2022, male students showed a further improvement in pass frequency with a percentage increase of 9.76%, while female students showed a slight increase in pass frequency with a percentage increase of 3.03%. Automotive transmission system: In all three years, male students had a higher pass frequency compared to female students however, both male and female students showed an improvement in pass frequency in 2021, with male students showing a percentage increase of 13.94% and female students showing a percentage increase of 15.02%. In 2022, both male and female students showed a further improvement in pass frequency, with male students showing a percentage increase of 20.92% and female students showing a percentage increase of 20.75%. Automotive hydraulic pump valves and actuators repairing: As performance trend shows both male and female students showed a decrease in pass frequency in 2021, with male students showing a percentage decrease of 7.77% and female students showing a percentage decrease of 2.2%. In 2022, both male and female students showed a further improvement in pass frequency, with male students showing a percentage increase of 13.74% and female students showing a percentage increase of 7.79%. Practical ATC: In all three years, male and female students showed high pass frequency, with both genders achieving over 98% pass frequency. In 2021 and 2022, female students achieved 100% pass frequency.

Table 73: Average score, SD and CV of scores in ATC trade

ATC		2019	2021	2022
Pneumatic and air brake system maintenance	Mean	63.01	64.94	53.73
	SD	15.17	18.78	18.71
	VC	24.08	28.92	34.83
Automotive engine and auxiliaries systems	Mean	57.32	51.12	53.86
	SD	18.03	17.22	17.94
	VC	31.46	33.68	33.31
Automotive steering suspension and hydraulic systems	Mean	59.86	44.28	51.29
	SD	17.57	18.65	19.46
	VC	29.36	42.12	37.93
Automotive transmission system	Mean	46.12	52.18	63.54
	SD	20.51	17.01	20.12
	VC	44.48	32.60	31.66
Automotive hydraulic pump valves and actuators repairing	Mean	67.79	66.44	65.32
	SD	17.13	17.06	17.46
	VC	25.27	25.68	26.74
Practical ATC	Mean	92.36	92.71	92.63
	SD	5.58	4.63	4.52
	VC	6.04	5.00	4.88

From the above table, the following observations are made: In the Pneumatic and air brake system maintenance trade, the mean score decreased from 63.01 in 2019 to 53.73 in 2022. Additionally, the SD and VC increased over the years, indicating increased variability in the scores obtained by students. In the Automotive engine and auxiliaries systems trade, the mean score decreased from 57.32 in 2019 to 51.12 in 2021 but increased slightly to 53.86 in 2022. The SD and VC remained relatively stable over the years, indicating consistent variability in the scores obtained by students. In the Automotive steering suspension and hydraulic systems trade, the mean score decreased significantly from 59.86 in 2019 to 44.28 in 2021 but increased to 51.29 in 2022. The SD and VC increased significantly from 2019 to 2021, indicating increased variability in the scores obtained by students, but decreased slightly in 2022.

In the Automotive transmission system trade, the mean score increased from 46.12 in 2019 to 63.54 in 2022. The SD decreased from 2019 to 2021 but increased slightly in 2022. The VC decreased significantly from 2019 to 2021 but increased slightly in 2022. In the Automotive hydraulic pump valves and actuators repairing trade, the mean score remained relatively stable over the years, ranging from 65.32

to 67.79. The SD and VC remained relatively stable as well, indicating consistent variability in the scores obtained by students. In the Practical ATC trade, the mean score remained consistently high, ranging from 92.36 to 92.71, indicating excellent performance by the students. The SD and VC also remained consistently low, indicating consistent performance by the students. Overall, the analysis of mean, SD, and VC provides valuable insights into the performance of students in different trade areas of the Automotive Training Centre. It can help identify areas of improvement and guide interventions to enhance student performance.

Table 74: Pass rate ATC trade by school ownership

ATC	Type of school	2019		2021		2022	
		No.	%	No.	%	No.	%
Pneumatic and air brake system maintenance	GA	56	96.55	161	95.3	137	100
	PR	1063	91.6	1002	77	1450	95.65
	PU	57	100.0	66	79.5	82	98.8
Automotive engine and auxiliaries' systems	GA	55	94.8	142	84	137	100
	PR	959	82.6	965	74.1	1449	95.58
	PU	55	96.49	57	68.7	82	98.8
Automotive steering suspension and hydraulic systems	GA	56	96.55	165	97.6	137	100
	PR	983	84.67	1087	83.5	1417	93.47
	PU	54	94.74	67	80.7	83	100
Automotive transmission system	GA	53	91.38	156	92.3	137	100
	PR	692	59.60	959	73.7	1467	96.77
	PU	49	85.96	67	80.7	83	100
Automotive hydraulic pump valves and actuators repairing	GA	57	98.28	165	97.6	136	99.27
	PR	1066	91.82	1088	83.5	1489	98.22
	PU	56	98.25	63	75.9	82	98.8
Practical ATC	GA	57	98.28	168	99.4	137	100
	PR	1157	99.66	1298	99.7	1516	99.93
	PU	57	100	82	98.8	83	100

As indicated in the above table, for the subject of Pneumatic and air brake system maintenance, in 2019, all three school ownership categories had high pass rates ranging from 91.6% to 100%. In 2021, PR schools had a lower pass rate of 77%, while GA and PU schools maintained high pass rates. In 2022, all school ownership categories achieved high a pass rate ranging from 95.65% to 100%. For Automotive

engine and auxiliaries' systems, in 2019, GA and PU schools had high pass rates ranging from 94.8% to 96.49%, while PR schools had a pass rate of 82.6%. In 2021, pass rates dropped for all school ownership categories, with PR schools having the lowest pass rate of 74.1%. In 2022, all school ownership categories achieved a pass rate of 95.58% or higher for this subject. For Automotive steering suspension and hydraulic systems, 2019, all three school ownership categories had high pass rates ranging from 84.67% to 96.55%. In 2021, pass rates dropped for PR schools, while GA and PU schools maintained high pass rates. In 2022, all school ownership categories achieved a pass rate of 93.47% or higher for this subject.

For Automotive transmission system, 2019, GA schools had the highest pass rate at 91.38%, followed by PU schools at 85.96%, and PR schools had the lowest pass rate at 59.60%. In 2021, pass rates decreased for all school ownership categories, with GA schools reporting the highest pass rate at 92.3%, followed by PU schools at 80.7%, and PR schools had the lowest pass rate at 73.7%. In 2022, pass rates increased again for all school ownership categories, with GA schools reporting the highest pass rate at 100%, followed by PU schools at 100%, and PR schools had the lowest pass rate at 96.77%.

For Automotive hydraulic pump valves and actuators repairing, in 2019, all three school ownership categories had high pass rates ranging from 91.82% to 98.28%. In 2021, pass rates dropped for PR schools, while GA and PU schools maintained high pass rates. In 2022, all school ownership categories achieved high pass rate of 98.8% to 99.27% for Practical ATC, in 2019, all three school ownership categories had high pass rates ranging from 98.28% to 100%. In 2021, pass rates dropped slightly for GA and PU schools, but remained high in 2022, all school ownership categories achieved a pass rate of 99.93% or higher for this subject.

3.5.6 Business Services (BUS) Trade

This section presents total number of students who attended courses in the trade of Business Services (BUS) National Exams across three years: 2019, 2021, and 2022. The table is divided into six subjects, and the number of students who attended each subject is listed for each year

Table 75: Total number of students registered in the trade of Business Services (BUS)

Subjects	2019	2021	2022
Bank account records and monetary transactions	84	164	128
Business management	84	164	128
Customer services coordination and delivery	84	164	128
Practical BUS	84	164	128
Stock and cash management	84	164	128
Taxes computation commission and market study	84	164	128

According to Table 75, in 2019, 84 students attended each of the six subjects. In the following two years, from 2020 to 2022, the number of students increased to 164, and then decreased to 128. It is worth noting that the number of students attending each exam doubled from 2019 to 2021. However, this increase did not persist, and the attendance numbers for 2022 was reduced.

It is important to note that the factors behind the reason why the number of students attending these subjects increased or decreased over time may be found through research. It is possible that external factors, such as changes in the job market or the availability of alternative educational programs, may have influenced these trends. Overall, the table suggests that the trade of Business Services has remained popular over the past three years, with a consistent number of students attending in each year.

Table 76: Pass rate trend in BUS in Core subjects

BUS	2019		2021		2022	
	No.	%	No.	%	No.	%
Business management	73	86.9	159	97.0	128	100
Stock and cash management	15	17.86	160	97.6	128	100
Bank account records and monetary transactions	48	57.14	160	97.6	126	98.44
Customer services coordination and delivery	76	90.48	163	99.4	128	100
Taxes computation commission and market study	53	63.1	163	99.4	128	100
Practical BUS	84	100	163	99.4	128	100

The above table shows that in In 2019, the highest performing subject was practical BUS with a perfect score of 100%. The other subjects ranged from 17.86% to 90.48% performance. In 2021, all subjects showed significant improvements in performance percentage with customer services coordination and delivery, taxes computation commission and market study, and practical BUS reaching a perfect score of 99.4%. The slight low performance was seen in subjects' stock and cash management, Bank account records and monetary transactions with performance of 96.6% while Business management had the lowest performance of 97.0%.

In 2022, all subjects continued to perform well with all subjects achieving a perfect score of 100%, except for bank account records and monetary transactions which had a slightly lower performance percentage of 98.44%. Overall, it seems like there has been a significant improvement in the performance percentages of different subjects in bus from 2019 to 2022.

Table 77: Pass rate in BUS by Gender

BUS		2019		2021		2022	
		No.	%	No.	%	No.	%
Business management	Female	64	85.33	137	97.08	107	100
	Male	9	100.00	26	96.30	21	100
Stock and cash management	Female	13	17.33	134	97.81	107	100
	Male	2	22.22	26	96.30	21	100
Bank account records and monetary transactions	Female	41	54.67	134	97.81	105	98.13
	Male	7	77.78	26	96.30	21	100
Customer services coordination and delivery	Female	68	90.67	137	100.00	107	100
	Male	8	88.89	26	96.30	21	100
Taxes computation commission and market study	Female	46	61.33	137	96.30	107	100
	Male	7	77.78	26	96.30	21	100
Practical BUS	Female	75	100.00	137	100.00	107	100
	Male	9	100.00	26	96.30	21	100

The pass rate for females has consistently been higher than for males, with 85.33% in 2019, 97.08% in 2021, and 100% in 2022. For males, the pass rate was 100% in 2019 and 96.30% in both 2021 and 2022. Stock and cash management: The pass rate for both females and males increased significantly for females from 17.33% in 2019 to 97.81% in 2021 and 100% in 2022. For males, the pass rate was 22.22% in 2019, but increased to 96.30% in 2021 and 100% in 2022. Bank account records and monetary transactions: The pass rate for females increased from 54.67% in 2019 to 97.81% in 2021, but slightly decreased to 98.13% in 2022. For males, the pass rate was 77.78% in 2019, 96.30% in 2020 /2021 and in 2022 increased to 100% Customer services coordination and delivery: The pass rate for females has consistently been higher than for males, with 90.67% in 2019, 100% in 2021, and 100% in 2022. For males, the pass rate was 88.89% in 2019 and 96.30% in 2021 with an increase of 100% in 2022. Taxes computation commission and market study: The pass rate for females increased from 61.33% in 2019 to 96.30% in 2021 and 100% in 2022 while males, the pass rate increased from 77.78% in 2019 to 96.30% in 2021 and 100% in 2022.

Practical BUS: The pass rate for both females and males was almost 100% in all years except in 2021 where male had a slight decrease of 96.30%. The pass rate for both females and males has shown a consistent improvement across all years.

Table 78: Mean Average score, SD and CV of scores in BUC trade

Subjects (BUS)		2019	2021	2022
Business management	Mean	53.26	78.79	81.78
	SD	12.09	13.61	10.79
	VC	22.70	17.27	13.19
Stock and cash management	Mean	30.46	69.82	85.12
	SD	9.54	14.11	13.88
	VC	31.30	20.21	16.31
Bank account records and monetary transactions	Mean	40.95	74.20	77.00
	SD	16.52	14.43	14.48
	VC	40.33	19.45	18.81
Customer services coordination and delivery	Mean	67.57	88.61	87.76
	SD	18.11	7.27	11.98
	VC	26.81	8.21	13.66
Taxes computation commission and market study	Mean	45.75	83.71	86.55
	SD	14.69	13.21	13.64
	VC	32.11	15.78	15.76
Practical BUS	Mean	97.75	98.71	97.60
	SD	2.98	2.28	2.79
	VC	3.05	2.31	2.85

The pass rate in Business management subject increased from 53.26 in 2019 to 78.79 in 2021 and further to 81.78 in 2022. However, the SD decreased from 12.09 in 2019 to 10.79 in 2022, indicating a more consistent performance across subjects. The VC also decreased from 22.70 in 2019 to 13.19 in 2022, which indicates that the performance variability decreased over the years.

For Stock and cash management, the mean performance increased from 30.46 in 2019 to 69.82 in 2021 and further to 85.12 in 2022. The SD increased from 9.54 in 2019 to 13.88 in 2022, indicating a higher variability in performance across subjects. The VC also increased from 31.30 in 2019 to 16.31 in 2022, which indicates that the performance variability decreased over the years.

For Bank account records and monetary transactions, the mean performance increased from 40.95 in 2019 to 74.20 in 2021 and further to 77.00 in 2022. The SD increased from 16.52 in 2019 to 14.48 in 2022, indicating a higher variability in performance across subjects. The VC also increased from 40.33 in 2019 to 18.81 in 2022. For Customer services coordination and delivery, the mean performance increased from 67.57 in 2019 to 88.61 in 2021 and further to 87.76 in 2022. The SD

decreased from 18.11 in 2019 to 7.27 in 2021 and increased to 11.98 in 2022, indicating a higher variability in performance in 2022. The VC decreased from 26.81 in 2019 to 8.21 in 2021 and increased to 13.66 in 2022.

For Taxes computation commission and market study, the mean performance increased from 45.75 in 2019 to 83.71 in 2021 and further to 86.55 in 2022. The SD increased from 14.69 in 2019 to 13.64 in 2022, indicating a higher variability in performance across subjects. The VC also increased from 32.11 in 2019 to 15.76 in 2022.

For Practical BUS, the mean performance was consistently high over the three years, with a mean of 97.75 in 2019, 98.71 in 2021, and 97.60 in 2022. The SD and VC were also consistently low, indicating a consistent and high level of performance across subjects.

We can see that the Bus trade performance improved over the years, with some variability in the SD and VC.

Table 79: Pass rate in BUC trade by school ownership

Subjects (BUS)		2019		2021		2022	
		No.	%	No.	%	No.	%
Business management	GA	56	90.32	113	98.3	79	100
	PR	3	60.0	8	72.7	17	100
	PU	14	82.4	38	100	32	100
Stock and cash management	GA	12	19.4	111	96.5	79	100
	PR		0.0	11	100	17	100
	PU	3	17.65	38	100	32	100
Bank account records and monetary transactions	GA	34	54.84	114	99.1	79	100
	PR		0.00	8	72.7	15	88.24
	PU	14	82.35	38	100	32	100
Customer services coordination and delivery	GA	56	90.32	114	99.1	79	100
	PR	4	80.00	11	100	17	100
	PU	16	94.12	38	100	32	100
Taxes computation commission and market study	GA	37	59.68	114	99.1	79	100
	PR		0	11	100	17	100
	PU	16	94.12	38	100	32	100
Practical BUS	GA	62	100	114	99.1	79	100
	PR	5	100	11	100	17	100
	PU	17	100	38	100	32	100

Analysis of pass rate in BUS by school ownership shows that for Business management, the highest pass rates were seen in the PU schools, with 82.4%, 100%, and 100% in the three respective years. GA schools had lower pass rates, but still saw high improvement in 2021 and 2022 with pass rates of 98.3% and 100%, respectively. PR schools had the lowest pass rates, with only 60% passing in 2019 and improving to 72.7% and 100% in the later years. For Stock and cash management, the PU schools had the highest pass rates in all three years, with 17.65%, 100%, and 100%, respectively. GA schools had the lowest pass rates but improved drastically from 19.4% in 2019 to 96.5% in 2021 and 100% in 2022. PR schools only had data for 2021 and 2022 but had a 100% pass rate in both years. For Bank account records and monetary transactions, the high pass rates were seen in the GA schools in all three years, with 54.84%, 99.1%, and 100%. PU schools had highest pass rates, with 82.35%, 100%, and 100% in the respective years. PR schools had no data for 2019 but had pass rates of 72.7% and 88.24% in 2021 and 2022, respectively.

For Customer services coordination and delivery, the highest pass rates were seen in the PU schools, with 94.12%, 100%, and 100% in the three respective years. GA schools had high pass rates as well, with 90.32%, 99.1%, and 100%. PR schools had lower pass rates, but still improved from 80% in 2019 to 100% in 2022. For Taxes computation commission and market study, the highest pass rates were seen in the PU schools, with 94.12%, 100%, and 100%. GA schools had lower pass rates, with 59.68%, 99.1%, and 100%. PR schools had no data for 2019, but had pass rates of 100% in 2021 and 2022. For Practical BUS, all schools had very high pass rates in all three years, with PU schools having 100% pass rates in all years, GA schools having 100% pass rates in 2019 and 2022 and 99.1% in 2021, and PR schools having 100% pass rates in all years. In general PU schools tended to have the highest pass rates across all subjects in all years, followed by GA schools, and then PR schools with the lowest pass rates. However, all schools showed improvements in pass rates over time.

3.5.7. Carpentry (CAP) Trade

This section presents the total number of students who attended the Carpentry (CAP) trade across three years – 2019, 2021, and 2022. It also gives summaries of students' performance and pass rate by gender and school ownership in each of the six subjects that constitute the BUS trade.

Table 80: Number of students registered in the trade of Carpentry (CAP)

Subjects	2019	2021	2022
Partition and exterior cladding installation	135	201	188
Practical CAP	135	201	188
Roof and shuttering construction	135	201	188
Technical drawing	135	201	188
Wood working materials, tools and equipment	135	201	188
Wooden staircase construction	135	201	188

The data in the above table shows that the number of students who attended the exams for each subject remained constant in each year across the three years, with 135 students attending each subject's exam in 2019, 201 students in 2021, and 188 students in 2022.

Looking at the breakdown of students attending each subject, we can see that the number of students attending each subject was consistent across all three years. This indicates that students are likely required to attend all the subjects listed to complete the Carpentry trade.

Overall, the table suggests that the Carpentry trade has a stable attendance of students across all subjects, with significant increase from 2019 to 2021 and slight decrease from 2021 to 2022.

Table 81: Pass rate trend in CAP trade Core subjects

CAP	2019		2021		2022	
	No.	%	No.	%	No.	%
Technical drawing	123	91.1	180	89.6	187	99.47
Roof and shuttering construction	132	97.78	192	95.5	188	100
Partition and exterior cladding installation	133	98.52	191	95.0	187	99.47
Wood working materials, tools and equipment	133	98.52	191	95.0	188	100
Wooden staircase construction	130	96.3	193	96.0	188	100
Practical CAP	135	100	201	100.0	188	100

The table above shows that in 2019, the lowest frequency of 91.1% was for Technical Drawing, while all other categories had a frequency of 98.52% or higher. In 2021, the lowest frequency 89.6% was for Technical Drawing again, but this time all other categories had a frequency of 95% or higher. In 2022, all categories had a

frequency of 99.47% or higher, except for Practical CAP, which had a perfect score of 100%. Overall, the data shows that the students in the CAP trade program have consistently performed well in all categories over the years.

Table 82: Pass rate in CAP by Gender

CAP		2019		2021		2022	
		No.	%	No.	%	No.	%
Technical drawing	Female	28	93.33	41	87.23	46	97.87
	Male	95	90.48	139	90.26	141	100
Roof and shuttering construction	Female	29	96.67	46	97.87	47	100
	Male	103	98.10	146	94.81	141	100
Partition and exterior cladding installation	Female	30	100.00	44	93.62	47	100
	Male	103	98.10	147	95.45	140	99.29
Wood working materials, tools, and equipment	Female	30	100.00	45	95.74	47	100
	Male	103	98.10	146	94.81	141	100
Wooden staircase construction	Female	28	93.33	44	93.62	47	100
	Male	102	97.14	149	96.75	141	100
Practical CAP	Female	30	100.00	47	100.00	47	100
	Male	105	100.00	154	100.00	141	100

As depicted in the above table, in general, the pass rates were high for both genders in all five categories, with some slight variations. In the Technical Drawing category, females had a higher pass rate than males in 2019, but males had a slightly higher pass rate in 2021 and 2022. Overall, both genders performed well in this category. In the Roof and Shuttering Construction category, females had a higher pass rate of 97.87% than male in 2021 and in the year 2019 male slightly performed better than female with 98.10% in 2022 both female and male had equal performance with 100%, the difference in pass rates between genders was very small in all three years. In the Partition and Exterior Cladding Installation category, females had a perfect pass rate in 2019 and 2022 with 100% but in 2021 male slightly performed better, while males had a slightly lower pass rate 99.29 in 2022. Again, both genders performed well in this category.

In the Wood Working Materials, Tools, and Equipment category, females had a perfect pass rate in all three years, while males had a slightly lower pass rate in 2021. Both genders performed well in this category. In the Wooden Staircase Construction category, females had a slightly lower pass rate than males in 2019 and 2021, but a perfect pass rate in 2022. Overall, both genders performed well in this category. In the Practical CAP category, both males and females had a perfect pass rate in all three years with 100%. It appears that both males and females

performed well in the CAP trade in the years 2019, 2021, and 2022. While there were some slight variations in pass rates between genders in certain categories

Table 83: Average score, SD and CV of scores in CAP trade

CAP		Pass (2019)	Pass (2021)	Pass (2022)
Technical drawing	Mean	52.95	67.83	66.38
	SD	10.25	13.80	15.71
	VC	19.36	20.35	23.67
Roof and shuttering construction	Mean	66.42	64.83	76.89
	SD	10.81	14.82	12.10
	VC	16.27	22.86	15.79
Partition and exterior cladding installation	Mean	70.94	71.62	60.37
	SD	11.70	10.43	14.30
	VC	16.49	14.57	23.69
Wood working materials, tools, and equipment	Mean	79.12	71.68	73.38
	SD	11.52	15.00	14.03
	VC	14.56	20.93	19.12
Wooden staircase construction	Mean	62.02	66.98	63.29
	SD	14.20	13.16	14.54
	VC	22.89	19.65	22.98
Practical CAP	Mean	90.40	92.47	92.40
	SD	6.76	6.43	5.01
	VC	7.47	6.95	5.42

Table 83 presents the performance of the CAP trade in the years 2019, 2020, and 2022, using, Mean, SD, and VC. Looking at the table, we can see that in 2019, the Practical CAP had the highest mean score of 90.40, whereas the technical drawing had the lowest mean score of 52.95. In 2021, the Practical CAP continued to have the highest mean score of 92.47, whereas the Roof and shuttering construction had the lowest mean score of 64.83. In 2022, the Practical CAP remained the highest with a mean score of 92.40, and Partition and exterior cladding installation had the lowest mean score of 60.37.

The SD values show that there was a significant amount of variation in the data for all the categories in all the years. However, the degree of variation increased for most categories in the later years. The VC values show that the level of variation relative to the mean was highest for the Wooden staircase construction category, followed by the technical drawing category in all three years. The Practical CAP

had the lowest VC, indicating that it had the least amount of variation relative to the mean score.

In general, it shows that the Practical CAP had the highest performance in all three years, whereas the technical drawing had the lowest performance. The data also shows that there was a significant amount of variation in the scores for all categories, with the degree of variation increasing in the later years. The Wooden staircase construction had the highest variability relative to the mean score.

Table 84: Pass rate of in CAP trade by school ownership

CAP		2019		2021		2022	
		No.	%	No.	%	No.	%
Technical drawing	GA	22	100	66	94.3	38	100
	PR	41	91.1	33	97.1	44	100
	PU	60	88.2	80	85.1	100	99.01
Roof and shuttering construction	GA	22	100.0	70	100	38	100
	PR	43	95.6	33	97.1	44	100
	PU	67	98.53	87	92.6	101	100
Partition and exterior cladding installation	GA	22	100.00	70	100	38	100
	PR	44	97.78	33	97.1	44	100
	PU	67	98.53	87	92.6	100	99.01
Wood working materials, tools and equipment	GA	22	100.00	69	98.6	38	100
	PR	44	97.78	34	100	44	100
	PU	67	98.53	87	92.6	101	100
Wooden staircase construction	GA	22	100	70	100	38	100
	PR	41	91.11	34	100	44	100
	PU	67	98.53	88	93.6	101	100
Practical CAP	GA	22	100	70	100	38	100
	PR	45	100	34	100	44	100
	PU	68	100	94	100	101	100

According to the Table 84, ownership (GA, PR, and PU) does not have a significant impact on the pass rate in the CAP trade. In most cases, the pass rates remain consistent across ownership categories. In the Technical drawing category, GA ownership had a perfect pass rate in all three years, while PR and PU ownership had high pass rates ranging from 91.1% to 97.1%. In the Roof and shuttering construction category, all ownership categories had high pass rates ranging from 92.6% to 100%.

In the Partition and exterior cladding installation and Wood working materials, tools and equipment categories, GA ownership had a perfect pass rate in all three years, while PR and PU ownership had high pass rates ranging from 92.6% to 100%. In the Wooden staircase construction category, GA ownership had a perfect pass rate in all three years, while PR and PU ownership had high pass rates ranging from 91.1% to 100%. In the Practical CAP category, all ownership categories had a perfect pass rate in 2019 and 2021. In 2022, PU ownership had a slightly lower pass rate of 94%, but all ownership categories still had a pass rate above 100%. As the data shows ownership does not have a significant impact on the pass rate in the CAP trade.

3.5.8. Crop Production Trade

The analysis of performance and pass rate in this trade focused on the total number of students who attended the trade of Crop Production (CRP) across three years (2019, 2021, and 2022), the general pass rate and performance, pass rate by gender and by school ownership.

Table 85: Total number of students registered in the trade of Crop Production (CRP)

Subjects	2019	2021	2022
Basic engineering sciences	472	590	426
Food crops and post-harvest handling	472	590	426
Methods of irrigation and extension technics	472	590	426
Non-ruminant farming	472	590	426
Nursery establishment and industrial crops	472	590	426
Plant biology, pests and diseases control	472	590	426
Practical CRP	472	590	426
Soil conservation	472	590	426

Based on the table, it can be observed that the total number of students who attended the CRP trade remained constant throughout the three academic years. Specifically, 472 students attended the CRP National Exams in 2019 in each subjects taught, academic year 2021, attendance increased to 590 students across all subjects and in 2022 the attended students decreased to 426 students. It can be concluded that the attendance rate for the CRP trade remained relatively stable in each year across the three academic years, with a slight increase in the academic year 2021. This consistency in attendance could be attributed to the importance of the CRP trade in the agricultural industry, which attracts a constant number of students each year.

Table 86: Pass rate trend in Crop Production (CPR) trade Core subjects

CPR	2019		2021		2022	
	No.	%	No.	%	No.	%
Food crops and post-harvest handling	422	89.4	503	85.3	426	100
Non-ruminant farming	409	86.65	414	70.2	396	92.96
Nursery establishment and industrial crops	424	89.83	567	96.1	421	98.83
Methods of irrigation and extension technics	351	74.36	440	74.6	426	100
Soil conservation	341	72.25	563	95.4	419	98.36
Basic engineering sciences	442	93.64	502	85.1	401	94.13
Plant biology, pests and diseases control	326	69.07	488	82.7	418	98.12
Practical CPR	470	99.58	585	99.2	426	100

Table 85 provides information on the frequency and percentage of pass rate in CPR trade for the years 2019, 2021, and 2022, in different subjects. In 2019, the highest performing category was practical CPR with a frequency 99.58% followed by basic engineering sciences with a frequency of 93.64%. The lowest performing category was plant biology, pests, and diseases control, with a frequency of 69.07%. In 2021, the highest performing category was nursery establishment and industrial crops, with a frequency of 96.1%, followed by food crops and post-harvest handling with a frequency of 85.3%. The lowest performing category was non-ruminant farming, with a frequency of 70.2%. In 2022, the highest performing category was Methods of irrigation and extension technics, practical CPR and food crops and post-harvest handling with a frequency of 100%. The lowest performing category was non-ruminant farming, with a frequency of 401 92.96%. Generally practical CPR is consistently a high-performing category across all three years. There are also notable fluctuations in performance for other categories between the years.

Table 87: Pass rate in CPR trade by Gender

CPR	Gender	2019		2021		2022	
		No.	%	No.	No.	%	No.
Food crops and post-harvest handling	Female	244	86.22	272	82.93	268	100
	Male	178	94.2	131	88.17	158	100
Non-ruminant farming	Female	230	81.3	195	59.45	241	89.93
	Male	179	94.71	219	83.59	155	98.1
Nursery establishment and industrial crops	Female	246	86.93	312	95.12	264	98.51
	Male	178	94.18	255	97.33	157	99.37
Methods of irrigation and extension technics	Female	186	65.72	206	62.80	268	100
	Male	165	87.30	234	89.31	158	100
Soil conservation	Female	183	64.66	311	94.82	262	97.76
	Male	158	83.59	252	96.18	157	99.37
Basic engineering sciences	Female	259	91.52	266	81.10	243	90.67
	Male	183	96.82	236	90.08	158	100
Plant biology, pests and diseases control	Female	180	63.60	257	78.35	262	97.76
	Male	146	77.24	231	88.17	156	98.73
Practical CPR	Female	281	99.29	325	99.09	268	100
	Male	189	100	260	99.24	158	100

Table 87 shows the pass rate in CPR trade based on gender in the years 2019, 2020, and 2022. Each category is divided into male and female, and the percentage of pass rates is shown. Overall males had a high pass rate in all subjects across all the years compared to female pass rates. In the category of food crops and post-harvest handling, males had a higher pass rate than females in 2019, with a pass rate of 94.2%, compared to 86.219% for females. In the category of basic engineering sciences, both males and females had a high pass rate in all years. Females had a pass rate of 91.519% in 2019, which decreased to 81.10% in 2021, and then increased to 90.67% in 2022. Males had a pass rate of 96.825% in 2019, which decreased to 90.08% in 2021, and then increased to 100% in 2022. In the category of practical CPR, both males and females had a high pass rate in all years. Females had a pass rate of 99.293% in 2019, which decreased slightly to 99.09% in 2021 and remained at 100% in 2022. Males had a pass rate of 100% in both 2019 and 2022, with a slightly lower pass rate of 99.24% in 2021.

Generally, performance was good in all category across all three years though there are also notable fluctuations in performance for other categories between the years.

Table 88: Average score, SD & CV of scores in CPR

		2019	2021	2022
Food crops and post-harvest handling	Mean	58.09	54.29	58.00
	SD	13.65	14.14	15.82
	VC	23.50	26.04	27.29
Non-ruminant farming	Mean	55.87	44.97	44.00
	SD	13.95	17.42	15.38
	VC	24.97	38.74	34.95
Nursery establishment and industrial crops	Mean	59.54	66.69	57.39
	SD	13.99	13.74	14.81
	VC	23.49	20.60	25.80
Methods of irrigation and extension technics	Mean	49.65	50.65	59.22
	SD	15.19	15.51	14.31
	VC	30.60	30.62	24.17
Soil conservation	Mean	48.27	68.76	60.02
	SD	15.62	15.23	17.71
	VC	32.36	22.15	29.51
Basic engineering sciences	Mean	43.06	54.04	44.82
	SD	15.71	13.05	15.27
	VC	36.48	24.14	34.08
Plant biology, pests and diseases control	Mean	46.33	57.05	51.72
	SD	13.99	17.82	16.91
	VC	30.19	31.23	32.70
Practical CPR	Mean	93.82	93.95	92.18
	SD	3.62	5.07	3.61
	VC	3.86	5.40	3.92

Table 88 shows the pass rate in CPR based on mean, standard deviation (SD), and coefficient of variation (VC) in different areas for three years: 2019, 2021, and 2022. In 2019, the highest mean score was in Practical CPR with 93.82%, while the lowest mean score was in Basic engineering sciences 43.06%. However, the mean scores for each area fluctuated over the three years. The SD for Basic engineering sciences in 2019 was the highest with 15.71, in 2021 Plant biology, pests and diseases control had the highest SD with 17.82. in 2021 and in 2022 Soil conservation marked the highest SD with 17.71 which means that the scores were more varied in all the years while practical CPR Showed the lowest SD across all the year.

measures the relative variability of the scores, with a higher VC indicating greater relative variability. Basic engineering sciences had the highest VC 36.48 in 2019, 2021 non-ruminant farming shows the highest VC with 38.74 and in 2022 Non-ruminant farming had the highest VC which 34.95 indicating greater relative variability while Practical CPR had the lowest VC in all years this that it had low variability. The performance in different areas varied over the three years, and some areas showed greater variability than others.

Table 89: Pass rate in CPR by school ownership

CPR		2019		2021		2022	
		No.	%	No.	No.	%	No.
Food crops and post-harvest handling	GA	166	87.83	168	90.8	98	100
	PR	51	72.9	74	66.7	123	100
	PU	205	96.7	258	90.5	191	100
Non-ruminant farming	GA	159	84.1	138	74.6	98	100
	PR	45	64.3	47	42.3	104	84.55
	PU	205	96.70	227	79.6	185	96.86
Nursery establishment and industrial crops	GA	165	87.30	181	97.8	98	100
	PR	51	72.86	101	91	120	97.56
	PU	208	98.11	278	97.5	189	98.95
Methods of irrigation and extension technics	GA	133	70.37	164	88.6	98	100
	PR	42	60.00	62	55.9	123	100
	PU	176	83.02	210	73.7	191	100
Soil conservation	GA	143	75.66	183	98.9	98	100
	PR	37	52.86	98	88.3	118	95.93
	PU	161	75.94	277	97.2	189	98.95
Basic engineering sciences	GA	174	92.06	167	90.3	97	98.98
	PR	59	84.29	73	65.8	106	86.18
	PU	209	98.58	256	89.8	188	98.43
Plant biology, pests and diseases control	GA	121	64.02	158	85.4	98	100
	PR	34	48.57	78	70.3	120	97.56
	PU	171	80.66	250	87.7	187	97.91
Practical CPR	GA	188	99.47	185	100	98	100
	PR	70	100	111	100	123	100
	PU	212	100	283	99.3	191	100

Table 89 shows pass rate across all the years 2019,2021, and 2022 based on school ownership. For food crops and post-harvest handling, all schools had high pass rates in all three years, with PU having the highest pass rates consistently. For non-ruminant farming, the pass rates were also high for all schools, but there was a decline in pass rates for PR schools in 2021, which improved in 2022. For nursery establishment and industrial crops, all schools had high pass rates, with GA and PU schools showing consistent high pass rates across all three years.

For methods of irrigation and extension techniques, GA and PU schools consistently had the highest pass rates, while PR schools had the lowest pass rates in 2021 but again in 2022 all school categories performance was very high with 100%. For soil conservation, GA and PU schools consistently had high pass rates, but PR schools had lower pass rates, especially in 2019 and 2022 and for basic engineering sciences, all schools had high pass rates, with GA and PU schools showing consistently high pass rates across all three years while PR had a decrease especially in 2021. For plant biology, pests, and diseases control, PR schools had the lowest pass rates in 2019 but improved significantly in 2021 and in 2022. GR schools had also low pass rates in 2019 but improved significantly in 2021 and 2022 while PU had a consistent high performance in all years. In practical CPR, all schools had extremely high pass rates consistently across all three years, with PR schools having the highest pass rates. In summary pass rates for CPR are generally high for all schools however there are variations in pass rates across school ownership in different subjects.

3.5.9 Customs and Taxation Operations (CTO) trade

The Customs and Tax Operations (CTO) National Exams results were analysed taking into account the pass rate and performance by gender and type of school ownership in 2019, 2021 and 2022. The table below presents the number of students registered in CTO.

Table 90: Number of students registered in CTO trade

Subjects	2019	2021	2022
Corporate accounting	103	93	118
Cost accounting	103	93	116
Customs law and clearing procedures	103	93	118
Economic environment	103	93	118
Financial accounting	103	93	118
Financial mathematics	103	93	118
Freight forward operation and tariff classification	103	93	118
Practical CTO	103	93	120
Tax audit	103	93	118
Taxation operations	103	93	118

Looking at the data in the above table, in 2019, the number of students who attended the CTO exams for each subject was 103. In the next two years, from 2021 to 2022, the number of students who attended the exams for each subject remained consistent, with only a few variations. In terms of individual subjects, the number of students who attended the exams for all ten subjects remained consistent across the three years. However, there were slight variations in the number of students attending some of the individual subjects. For example, the number of students who attended the exams for Cost Accounting decreased from 103 in 2019 to 93 in 2021, and then increased slightly to 116 in 2022. In contrast, the number of students who attended the Practical CTO exams increased from 103 in 2019 to 120 in 2022. Overall, the table suggests that the number of students who attended the CTO exams remained consistent in each year across the three years. However, there were slight variations in the number of students who attended some of the individual subjects such as Cost accounting and Practical CTO.

Table 91: Pass rate trend in CTO trade in Core subjects

Customs and Taxation Operations (CTO)	2019		2021		2022	
	No.	%	No.	%	No.	%
Financial accounting	46	44.7	78	83.9	112	94.92
Economic environment	51	49.51	82	88.2	116	98.31
Corporate accounting	27	26.21	72	77.4	112	94.92
Taxation operations	54	52.43	76	81.7	118	100
Financial mathematics	31	30.1	63	67.7	100	84.75
Customs law and clearing procedures	72	69.9	85	91.4	116	98.31
Cost accounting	38	36.89	74	79.6	102	87.93
Tax audit	58	56.31	78	83.9	114	96.61
Freight forward operation and tariff classification	73	70.87	87	93.5	116	98.31
Practical CTO	89	86.41	93	100.0	114	95

Table 91 presents students' performance in the trade of Customs and Taxation Operations (CTO) across three years – 2019, 2021, and 2022. The table includes nine subjects that fall under CTO, and for each subject, the table shows the number of students who passed in each year, along with the percentage of students who passed. Looking at individual subjects, students' performance in Financial Accounting, the percentage of students passing increased from 44.7% in 2019 to 83.9% in 2021 and 94.92% in 2022, which is a substantial improvement of more than 50% increase within three years. Students' performance in Economic

Environment subject increased from 49.51% to 88.2% and further to 98.3% in 2019, 2021 and 2022 respectively. Students' performance in corporate accounting subject increased from 26.21% to 77.4% and further to 94.92% in 2019, 2021 and 2022 respectively. Corporate Accounting is nonetheless the course students perform the least in 2019 and was recorded the second bottom in 2021. This highlights the need for efforts in this subject. Students' performance in Taxation Operations subject increased from 52.43% in 2019 to 81.7% in 2021 and further to an impressive 100% pass rate in 2022, making it the only subject passed by all students in that year. The performance in this subject shows positive improvement that could be due to efforts invested in it by different concerned parties.

Students' performance in Financial Mathematics subject consistently has the lowest passing rate across all three years, hitting the lowest pass rate in all CTO subjects in 2019 at 30.1% then increased to 67.7% in 2021 and further to 84.75% in 2022 yet being the least succeeded course in the two last academic years. This indicates the existence of challenges in this subject and the need for resolutions. Students' performance in Customs law and cleaning procedures subject increased from 69.9% to 91.4% and further to 98.3% in 2019, 2021 and 2022 respectively. Students' performance in this subject demonstrates a consistent positive trend as time goes on. Students' performance in Cost Accounting subject also recorded a positive trend as it improved from 36.89% in 2019 to 79.6% and extended to 87.93% in 2021 and 2022 respectively. However, comparing the performance of students in this subject to other subjects, it is observed that it still lags behind other courses and therefore calls for attention as well. Students' performance in Tax audit subject recorded a positive tendency as well, increasing from 56.31% to 83.9% and further to 96.61% in 2019, 2021 and 2022 respectively. Students' performance in Freight forward operation and tariff classification subject shows that it is the second most mastered subject by students after practical CTO, recording a positive trendy as well from 70.87% to 93.5% and to 98.31% in 2019, 2021 and 2022 respectively. This indicates that the right things are being done in this subject leading to students consistently performing well in this course. Practical CTO subject has the highest passing rate in the first two years, with 86.41% pass rate in 2019, and 100% of students passing in 2021, a slight decrease was observed in 2022 when 95% of students passed the National Exam.

As a general observation, some subjects such as Customs Law and Clearing Procedures, Tax Audit, and Freight Forward Operation and Tariff Classification, have consistently high passing rates across all three years. However, other subjects, such as corporate accounting, Financial Accounting and Cost Accounting, show a notable improvement in the percentage of students passing in 2022 compared to the previous years. In conclusion, the table suggests an overall improvement in the performance of CTO students over the years. However, there are significant variations in the performance of different subjects, with some consistently outperforming others. The analysis of the table can provide valuable insights for instructors and policymakers to identify areas that require improvement and

implement targeted interventions to enhance the quality of education in Customs and Taxation Operations trade.

Analyze students' performance by gender in each of the subjects under the trade of Customs and Taxation Operations (CTO) in 2019, 2021 and 2022 national examinations. Analyzing each year separately.

Table 92: Pass rate in CTO Trade by Gender

CTO		2019		2021		2022	
		No.	%	No.	%	No.	%
Financial accounting	Female	33	46.48	51	79.69	64	92.75
	Male	13	40.63	39	81.25	48	97.96
Economic environment	Female	34	47.89	50	78.13	67	97.1
	Male	17	53.13	47	97.92	49	100
Corporate accounting	Female	18	25.35	47	73.44	65	94.2
	Male	9	28.13	36	75.00	47	95.92
Taxation operations	Female	35	49.30	52	81.25	69	100
	Male	19	59.38	41	85.42	49	100
Financial mathematics	Female	17	23.94	41	64.06	56	81.16
	Male	14	43.75	38	79.17	44	89.8
Customs law and clearing procedures	Female	46	64.79	56	87.50	67	97.1
	Male	26	81.25	45	93.75	49	100
Cost accounting	Female	29	40.85	47	73.44	59	88.06
	Male	9	28.13	42	87.50	43	87.76
Tax audit	Female	40	56.34	49	76.56	65	94.2
	Male	18	56.25	43	89.58	49	100
Freight forward operation and tariff classification	Female	50	70.42	60	93.75	67	97.1
	Male	23	71.88	45	93.75	49	100
Practical CTO	Female	62	87.32	64	100.00	65	91.55
	Male	27	84.38	48	100.00	49	100

Table 92 provides details the pass rates and frequencies by gender for each subject under the trade of Customs and Taxation Operations (CTO) in the 2019, 2021, and 2022 national examinations. For financial Accounting, in 2019, the pass rate for females was 46.48%, while for males, it was 40.63%. In 2021, the pass rate increased significantly for both females (79.69%) and males (81.25%). In 2022, the pass rate continued to increase, with a 92.75% pass rate for females and a 97.96% pass rate for males. In this subject, no gender dominated the other. For

economic Environment, in 2019, the pass rate for females was 47.89%, while for males, it was 53.13%. In 2021, the pass rate increased for both females (78.13%) and males (97.92%). In 2022, the pass rate for females continued to increase up to 97.1%, while the pass rate for males reached 100%. In this subject male student outperformed their female colleagues across the studied years. For Corporate Accounting, in 2019, the pass rate for females was 25.35%, while for males, it was 28.13%. In 2021, the pass rate significantly increased for both females (73.44%) and males (75.00%). In 2022, the pass rate continued to increase, with a 94.2% pass rate for females and a 95.92% pass rate for males. In this subject male student consistently performed better than female students. Analyzing the performance in the taxation Operations subject, in 2019, the pass rate for females was 49.30%, while for males, it was 59.38%. In 2021, the pass rate significantly increased for both females (81.25%) and males (85.42%). In 2022, the pass rate for females and males both increased to 100% indicating that in the final year, both genders had mastered the content of this subject at the same level. For Financial Mathematics, in 2019, the pass rate for females was 23.94%, while for males, it was 43.75%. In 2021, the pass rate significantly increased for both females (64.06%) and males (79.17%). In 2022, the pass rate continued to increase, with an 81.16% pass rate for females and a 89.8% pass rate for males. Once again, males outperformed their female counterparts. For Customs Law and Clearing Procedures, in 2019, the pass rate for females was 64.79%, while for males, it was 81.25%. In 2021, the pass rate for females was 87.5%, while for males, it was 93.75%. In 2022, the pass rate for females increased to 97.1%, while for males, it remained at 100%.

In the subject of Customs law and clearing procedures, both male and female students have shown an improvement in their performance over the years. Male students have consistently performed better than female students in this subject. Females pass rate grew from 64.79% in 2019 to 87.50% in 2021 increasing to 97.1% in 2022, while male students started with a pass rate of 81.25% in 2019, increased to 93.75% and improved to a perfect pass rate of 100% in 2022.

For the subject of Cost accounting, both male and female students have also shown an improvement in their performance over the years. However, female students performed better than male students in this subject, with a pass rate of 40.85% in 2019 increasing to 73.44 in 2021 and further to 88.06% in 2022, while male students started with a pass rate of 28.13% in 2019, improved to 87.50% in 2021 and remained constant at 87.76% in 2022.

In the subject of Tax audit, both male and female students have again shown an improvement in their performance over the years. Male students did better than their female colleagues in this subject, with a pass rate of 56.34% in 2019 increasing to 76.56% in 2021 and further to 94.2% in 2022, while male students started with a pass rate of 56.25% in 2019, increased to 89.58% in 2021 and improved to a perfect pass rate of 100% in 2022.

In the subject of Freight forward operation and tariff classification, both male and female students have shown an improvement in their performance over the years.

Both genders performed almost at the same level in this subject, with female's pass rate of 70.42% in 2019 increasing to 93.75% in 2021 and further to 97.1% in 2022, while male students started with a pass rate of 71.88% in 2019 which grew to 93.75% (same pass rate as their female colleagues) in 2021 and also improved to a perfect pass rate of 100% in 2022.

Finally, in the subject of Practical CTO, both male and female students have shown a consistently high level of performance over the years, with female students starting with a pass rate of 87.32% in 2019, hitting a perfect pass rate of 100% in 2021 and slightly decreasing to 91.55% in 2022. Male students also started with a high pass rate of 84.38 in 2019 and improved to the full pass rate of 100% in 2021 which was maintained in 2022.

Overall, there were significant improvements in the pass rates for both females and males in most subjects between 2019 and 2022, with most subjects achieving a pass rate of 90% or higher in the last year. While females showed a slight dip in 2021 before recovering in 2022, they also tended to have slightly lower pass rates than males in most subjects, the difference was not substantial.

Table 93: Average score, SD & CV of scores in CTO

CTO		2019	2021	2022
Financial accounting	Mean	36.48	48.97	48.27
	SD	14.24	20.89	19.33
	VC	39.03	42.66	40.05
Economic environment	Mean	43.61	68.26	69.00
	SD	21.54	15.70	18.03
	VC	49.40	23.01	26.13
Corporate accounting	Mean	28.49	37.71	44.85
	SD	17.46	17.58	15.38
	VC	61.27	46.62	34.28
Taxation operations	Mean	43.63	55.81	49.14
	SD	19.67	16.76	14.12
	VC	45.08	30.02	28.75
Financial mathematics	Mean	32.17	26.50	22.93
	SD	13.24	16.89	12.41
	VC	41.15	63.75	54.12
Customs law and clearing procedures	Mean	51.73	77.77	71.97
	SD	23.46	19.35	21.28
	VC	45.35	24.89	29.57

Cost accounting	Mean	36.32	56.41	47.07
	SD	15.76	18.34	25.22
	VC	43.38	32.51	53.58
Tax audit	Mean	44.17	44.67	57.41
	SD	20.90	14.37	22.82
	VC	47.33	32.18	39.75
Freight forward operation and tariff classification	Mean	57.88	73.71	80.37
	SD	23.33	14.06	17.01
	VC	40.31	19.08	21.16
Practical CTO	Mean	75.34	85.21	84.80
	SD	19.05	5.13	7.37
	VC	25.29	6.02	8.69

Table 93 provides information on the average score variation coefficients trend in the trade of Customs and Taxation Operations (CTO) across three years: 2019, 2021, and 2022. The variation coefficient (VC) indicates the degree of variation or dispersion in a set of data relative to the mean. A higher VC suggests greater variability or spread in the data, while a lower VC indicates more consistency or uniformity. Looking at the table, we can observe that the mean scores for most of the CTO courses have increased from 2019 to 2021 but slightly decreased in 2022. The exceptions are Economic environment, corporate accounting, Tax audit, Freight forward operation and tariff classification and Practical CTO course, which has seen a consistent though relatively low increase in mean scores across the three years. The variation coefficients have varied across the different CTO courses and years. In some courses, such as Corporate Accounting and Taxation Operations, the variation coefficient kept on decreasing across the three years, indicating lesser variability and more consistency in scores. Interestingly, some courses have shown a fluctuating behavior, recording a significant decrease in the variation coefficient from 2019 to 2021 and a slight increase in 2022, these include Economic Environment, Customs law and clearing procedures, Cost accounting, Tax audit, Freight forward operation and tariff classification as well as Practical CTO. This could be attributed to the impact of the COVID-19 pandemic, which may have led to a more standardized teaching and assessment approach. However, in other courses like Financial Accounting and Financial Mathematics, the variation coefficient has increased from 2019 to 2021, suggesting greater variability in scores. In summary, the table shows that while the mean scores have varied across the different CTO courses and years, the trend in the variation coefficient is not consistent. Some courses have become more consistent in their scores, while others have become more variable. The reasons for these variations are unclear and may require further investigation.

Table 94: Pass rate in CTO trade by school ownership

CTO		2019		2021		2022	
		No.	%	No.	No.	%	No.
Financial accounting	PR	36	70.59	51	94.4	33	94.29
Economic environment	PR	41	80.4	49	90.7	35	100
Corporate accounting	PR	26	51.0	48	88.9	35	100
Taxation operations	PR	38	74.5	47	87	35	100
Financial mathematics	PR	14	27.5	27	50	31	88.57
Customs law and clearing procedures	PR	45	88.24	53	98.1	35	100
Cost accounting	PR	28	54.90	46	85.2	35	100
Tax audit	PR	40	78.43	50	92.6	35	100
Freight forward operation and tariff classification	PR	51	100.00	52	96.3	35	100
Practical CTO	PR	51	100.00	54	100	35	100

Table 94 shows the percentage of students who passed the Customs and Taxation Operations (CTO) trade in three consecutive academic years (2019, 2021, and 2022) categorized by the school ownership status – Public (PU), Government Aided (GA), and Private (PR). As observed, CTO is only taught in Private schools. In general, the pass rate increased across all subjects from 2019 to 2022.

3.5.10 Culinary Arts (CUA) trade

Like other trades, the general performance and pass rate of students in Culinary Arts were analysed and gender and type of school ownership were considered.

Table 95: Total number of students registered in the trade of Culinary Arts (CUA)

Subjects	2019	2021	2022
Coaching section staff on job skills	1227	1697	1909
Cooking methods and basic dishes	1227	1697	1908
Food preparations	1227	1697	1904
Food storage and safety	1227	1697	1909
Practical CUA	1227	1697	1909
Principles of catering and stock control	1227	1697	1909

From the above table, in 2019, there were 1227 students who attended the CUA National Exam for each of the six subjects. In 2021, the number of students who attended the exam increased to 1697 for each subject. In the most recent year,

2022, there was a further increase in the number of students attending the exam, ranging between 1904 to 1909 students attending for each subject. Overall, there has been a consistent increase in the number of students attending the CUA National Exam over the three-year period. This could indicate growing interest in the culinary arts trade or an increase in the number of culinary arts programs offered in schools or vocational institutions. Additionally, the fact that there is a consistent number of students attending the exam for each subject suggests that the subjects covered in the exam are equally important in preparing students for a career in culinary arts.

Table 96: Pass rate trend in Culinary Arts (CUA) Core subjects

CUA	2019		2021		2022	
	No.	%	No.	%	No.	%
Coaching section staff on job skills	992	80.9	1454	85.7	1801	94.34
Food preparations	218	17.77	1406	82.9	1787	93.86
Principles of catering and stock control	853	69.52	1397	82.3	1781	93.29
Cooking methods and basic dishes	960	78.24	1451	85.5	1869	97.96
Food storage and safety	523	42.62	1398	82.4	1836	96.18
Practical CUA	1201	97.88	1680	99.0	1909	100

According to the table above, the number of students who sat for CUA increased from 992 in 2019 to 1454 in 2021 and further to 1801 in 2022. Analyzing the performance of students in each individual course, the performance of students in coaching section staff on job skills subject increased steadily over the three years with 80.9% of them passing in 2019 to 85.7% in 2021 and further to 94.34% in 2022. The trend of students' performance in food preparations also exhibited a similar trend, with a sharp increase in 2021 from the recorded pass rate of 17.77% to 82.9% in 2021, followed by a modest increase to 93.86% in the year 2022. This suggests that students faced difficulties in understanding and applying the principles of food preparation in 2019, which were addressed in the subsequent academic year. Moreover, students' performance in Principles of catering and stock control subject increased notably from 69.52% in 2019 to 82.3% in 2021 and further to 93.29% in 2022, indicating a significant improvement in students understanding of this subject. The percentage of students' passing in cooking methods and basic dishes subject also showed a steady increase over the three years from 78.24.5 in 2019 to 85.5.% in 2021 and then to 97.96% in 2022 academic year.

Students' performance in food storage and safety subject also improved significantly over the three years with the lowest record of 42% pass rate in 2019 changing into an interesting 82.4% in 2021 and further growing to 96.18% in 2022,

indicating a notable improvement in their understanding and application of food storage and safety principles in the culinary arts trade.

Students' performance in practical CUA remained consistently high compared to all other subjects, indicating that students have gained strong practical skills from this course. The pass rate in this subject increased from 97.88% in 2019 to 100% in 2022

Overall, the most significant improvement in performance was observed in food preparations, where the percentage of students who passed increased from 17.77% in 2019 to 93.86% in 2022. This is followed by food storage and safety, where the percentage of students who passed increased from 42.62% in 2019 to 96.18% in 2022. The subjects with the highest pass rates across all three years were practical CUA, coaching section staff on job skills, and cooking methods and basic dishes. In 2019, the highest performing subject was "Practical CUA" with a pass rate of 97.88%, followed by "Coaching section staff on job skills" at 80.9%. The lowest performing subject was "Food preparations" with a pass rate of only 17.77%.

In 2021, a significant improvement in the performance of all subjects, with "Coaching section staff on job skills" and "Food preparations" both showing pass rates of over 82%. "Practical CUA" remained the highest performing subject with a pass rate of 99%. In 2022, the trend of improvement continued, with all subjects showing pass rates of over 90%, and "Practical CUA" achieving a perfect score of 100%. In conclusion, we can see that there was a consistent improvement in student performance across all subjects in the trade of Culinary Arts, with "Practical CUA" being the strongest performing subject throughout the three years.

Table 97: Pass rate in CUA Trade by Gender

CUA		2019		2021		2022	
		No.	%	No.	%	No.	%
Coaching section staff on job skills	Female	750	79.533	1196	83.75	1398	94.52
	Male	242	85.2	368	84.02	403	93.72
Food preparations	Female	156	16.5	1142	79.97	1385	93.71
	Male	62	21.83	356	81.28	402	94.37
Principles of catering and stock control	Female	642	68.08	1153	80.74	1375	92.97
	Male	211	74.30	350	79.91	406	94.42
Cooking methods and basic dishes	Female	727	77.09	1200	84.03	1445	97.77
	Male	233	82.042	363	82.88	424	98.6
Food storage and safety	Female	377	39.979	1153	80.74	1418	95.88
	Male	146	51.408	348	79.45	418	97.21
Practical CUA	Female	924	97.985	1412	98.88	1479	100
	Male	277	97.535	428	97.72	430	100

From the above table, it is observed that the pass rates for both male and female students increased from 2019 to 2022 and male students had a higher pass rate than Female students in all subjects in 2019 and 2022. However, In the 2021 academic year in which females outperformed their male colleagues in all courses except in Food Preparations and Coaching section staff on job skills. Moreover, for Practical CUA in 2019 and coaching section staff on job skills in 2022, Female students had a slightly higher pass rate.

It is worth noting that the pass rate for female students in Food preparations increased significantly from 16.5% in 2019 to 93.71% in 2022, while the pass rate for male students in Food preparations increased from 21.83% to 94.37% over the same period. Overall, the data suggests that both male and female students in Culinary Arts are improving their performance.

Table 98: Average score, SD & CV of scores in CUA trade

CUA		2019	2021	2022
Coaching section staff on job skills	Mean	60.90	74.44	55.97
	SD	21.62	19.08	21.98
	VC	35.50	25.63	39.28
Food preparations	Mean	25.49	65.92	58.42
	SD	14.80	19.33	20.87
	VC	58.09	29.33	35.72
Principles of catering and stock control	Mean	50.98	66.76	52.79
	SD	20.51	19.31	18.91
	VC	40.23	28.93	35.83
Cooking methods and basic dishes	Mean	54.86	79.95	71.66
	SD	17.99	17.34	18.72
	VC	32.79	21.69	26.13
Food storage and safety	Mean	36.56	60.35	64.70
	SD	20.38	21.80	21.54
	VC	55.75	36.12	33.29
Practical CUA	Mean	90.18	93.16	92.45
	SD	6.70	4.13	4.71
	VC	7.43	4.44	5.10

Concerning the subject of coaching section staff on job skills, the mean score ranged between 55.97% and 74.44% within the three years, with a peak having been recorded in 2021 at 74.44%. The SD fluctuated between 19.08 and 21.98. The VC for this subject increased from 35.50 in 2019 to 39.28 in 2022 but had recorded a slight decrease to 25.63 in 2021, indicating inconsistency of students' performance in this

subject. The mean score for food preparations increased significantly from 25.49 in 2019 to 65.92 in 2021 and then slightly decreased to 58.42 in 2022. However, the SD also increased from 14.80 in 2019 to 20.87 in 2022, while the VC decreased from 58.09 in 2019 to 29.33 and added a bit to 35.72 in 2022. These changes suggest a significant improvement in students' performance in this subject. The average score for principles of catering and stock control showed a positive trend from 50.98 in 2019 to 52.79 in 2022, with a peak in 2021 (66.76). The SD decreased over time, with the lowest value in 2022 (18.91), and the VC decreased from 40.23 in 2019 to 35.83 in 2022 with the lowest record of 28.93 in 2021. These findings suggest that students perform better in this subject as time goes on but also that students did better in 2021 compared to the year that followed. The mean score for cooking methods and basic dishes increased significantly from 54.86 in 2019 to 79.95 in 2021 and then decreased slightly to 71.66 in 2022. The SD also decreased over the years, with the lowest value in 2021 (17.34). The VC decreased from 32.79 in 2019 to 21.69 and then somewhat increased to 26.13 in 2022, suggesting an overall decrease in the variability of the scores over time.

The mean score for food storage and safety increased from 36.56 in 2019 to 64.70 in 2022. The SD remained relatively stable over the years, while the VC decreased from 55.75 in 2019 to 33.29 in 2022, indicating a decrease in the variability of the scores over time and therefore better students' performance in this subject. Finally, the mean score for practical CUA was consistently high across the years, with a slight increase from 90.18 in 2019 to 93.16 in 2021 and then a slight decrease to 92.45 in 2022. The SD and VC values were also consistently low across the years, indicating high consistency and low variability in the scores for this subject.

In summary, the analysis of the table indicates varying levels of improvement, stability, or decline in students' performance in different subjects under the Culinary Arts trade across the three years. It also highlights differences in the variability of the scores across subjects and years. However, it shows that students performed better in the year 2021 compared to other years.

Table 99: Pass rate in Culinary Arts trade by school ownership

CUA		2019		2021		2022	
		No.	%	No.	%	No.	%
Coaching section staff on job skills	GA			22	100	36	100
	PR	783	83.1	1090	87.8	1244	95.03
	PU	46	97.9	110	98.2	140	96.55
Food preparations	GA			22	100	36	100
	PR	182	19.3	1069	86.1	1248	95.41
	PU	27	57.45	111	99.1	138	95.17

Principles of catering and stock control	GA			19	86.4	36	100
	PR	663	70.38	1041	83.9	1255	95.87
	PU	47	100.00	109	97.3	135	93.1
Cooking methods and basic dishes	GA			22	100	36	100
	PR	768	81.53	1088	87.7	1294	98.85
	PU	47	100	108	96.4	143	98.62
Food storage and safety	GA			22	100	36	100
	PR	426	45.22	1056	85.1	1268	96.87
	PU	40	85.11	108	96.4	390	93.08
Practical CUA	GA			22	100	36	100
	PR	931	98.83	1234	99.4	1310	100
	PU	47	100	112	100	145	100

Table 99 presents the pass rates of students in Culinary Arts across three academic years, from 2019 to 2022, based on school ownership status (Public, Government Aided, and Private) and subjects under the Culinary Arts Trade. The pass rates are represented in both frequency and percentage. Looking at the data, this trade was not being taught in Government Aided (GA) schools in the academic year 2019. However, all students in Government Aided schools passed in 2021 and 2022 passed at 100% in all subjects, indicating that GA schools do better than schools owned by the Private sector and schools fully owned by the Public. The pass rates for other types of schools improved across the years, with Public (PU) schools consistently having the second highest pass rates for all subjects, and Private (PR) schools ranking third mostly in the 2019 and 2021 National Exams. For “Coaching section staff on job skills,” Public schools had consistent high pass rates of 97.9%, 98.2%, and 96.55% in 2019, 2021, and 2022 respectively. Private schools came in third with 83.1%, 87.8%, and 95.03% pass rates in 2019, 2021, and 2022 respectively. In “Food preparations,” Private schools had pass rates of 19.3% in 2019, 86.1%, in 2021 and 95.41% in 2019 in 2022 respectively. Showing a recommendable increase in students’ performance between 2019 and 2021. Public schools had pass rates of 57.45%, 99.1%, and 95.17% in 2019, 2021, and 2022 respectively, showing that Private schools slightly outperformed the public schools in 2022.

For “Principles of catering and stock control,” Private schools had pass rates of 70.38%, 83.9%, and 95.87% in 2019, 2021, and 2022 respectively. Public schools had pass rates of 100%, 97.3%, and 93.1% in 2019, 2021, and 2022 respectively, indicating that Private schools outperformed the public schools in 2022. In “Cooking methods and basic dishes”. Private schools had pass rates of 81.53%, 87.7%, and 98.85% in 2019, 2021, and 2022 respectively. Public schools had pass rates of 100%, 96.4%, and 98.62% in 2019, 2021, and 2022 respectively. For “Food storage and safety” Private schools had pass rates of 45.22%, 85.1%, and 96.87% in 2019, 2021, and 2022

respectively. Public schools had pass rates of 85.11%, 96.4%, and 93.08% in 2019, 2021, and 2022 respectively. Showing that Private schools a touch outperformed the public schools in 2022. Lastly, in “Practical CUA,” Private schools had pass rates of 98.83%, 99.4% and 100% in 2019, 2021, and 2022 respectively. In Public schools all students passed at 100% 2019, 2021 and 2022.

3.5.11. Electronic Service (ELS) Trade

This section provides the total number of students who attended the National Exams in the trade of Electronic services (ELS) across three years (2019, 2021, and 2022), the general performance and pass rate according to gender and type of school ownership.

Table 100: Total number of students registered in ELS trade

Subjects	2019	2021	2022
Apply basic microcontroller	858	941	872
Fundamentals of electronics	858	941	872
Install and repair CCTV camera system	858	941	872
Install and repair fire detector system	858	941	872
Maintain electronic display	858	941	871
Practical ELS	858	941	872

From the table above it is observed that the total number of attended students in ELS National Exams remained relatively stable in each year across the three years, with a slight decrease of 1 student in the subject “Maintain electronic display” in 2022 compared to the previous year. The number of attended students for all six subjects was consistently around 858 in 2019, increased to 941 in 2021, and then decreased slightly to 872 or 871 in 2022. This suggests that there is a consistent level of interest in the trade of ELS among students, and that the demand for ELS-related skills may have increased slightly in 2021 but stabilized in 2022.

The clear increase from 2019 to 2021 could be attributed to various factors, such as the increased popularity of the ELS trade, the availability of funding or scholarships, or the rising demand for professionals in the field. However, the slight decrease in 2022 could be due to a variety of reasons, such as changes in the economy or job market, or shifts in educational priorities among prospective students.

Additionally, we can observe that there is no significant variation in the number of attended students across the six subjects in each year, suggesting that the interest in different subjects in ELS trade remains relatively balanced. It’s worth noting that the subjects tested in the National Exams are practical and hands-on, indicating that students are likely to gain practical skills and knowledge relevant to the ELS trade.

Table 101: Pass rate trend in ELS trade Core subjects

ELS	2019		2021		2022	
	No.	%	No.	No.	No.	%
Apply Basic Microcontroller	335	39.0	811	86.2	858	98.4
Maintain Electronic Display	616	71.79	892	94.8	790	90.7
Fundamentals of Electronics	250	29.14	786	83.5	738	84.63
Install and repair CCTV camera system	608	70.86	786	83.5	859	98.51
Install and Repair Fire Detector System	797	92.89	876	93.1	865	99.2
Practical ELS	851	99.18	940	99.9	872	100

Table 101 shows the frequency and percentage of students' performance in each subject under the trade of Electronic Services (ELS) for three different national examinations held in 2019, 2021, and 2022. Overall, there is a significant improvement in students' performance in all subjects between 2019 and the subsequent years. In 2019, the percentage of students who passed each subject ranged from 29.14% to 92.89%, while in 2021 and 2022, the percentage of passing students increased significantly, ranging from 83.5% to 99.9% and 84.63% to 100%, respectively. In 2019, the subject with the highest percentage of passing students was "Install and Repair Fire Detector System" with 92.89%, followed by "Practical ELS" with 99.18%. However, in the subsequent years, "Practical ELS" became the subject with the highest percentage of passing students, with 99.9% and 100% in 2021 and 2022, respectively.

For the subject "Apply Basic Microcontroller," there was a significant increase in the percentage of passing students between 2019 and the subsequent years, from 39% to 86.2% and 98.4%, respectively. Maintain Electronic Display recorded a significant increase in the percentage of passing students between 2019 and 2022, from 71.79% to 94.8% yet it is the only subject that experienced a decrease in the passing rate the following year of 2022 because it recorded a 90.7% pass rate. Fundamentals of Electronics is the course the least mastered by students drawing the conclusion from how students passed it in the three years, having recorded the lowest pass rate of 29.14% in 2019 though improving to 83.5% and 84.63 in 2021 and 2022 respectively, it still ranked at the bottom. For "Install and repair CCTV camera system", the subject seen a consistent positive trend in students' performance throughout the three years. It increased from 70.86% in 2019 to 83.5% in 2021 and then further recorded another 15% increase to 98.51% pass rate in 2022 academic year. This shows that students continue to show mastery of this subject. Students have also showed consistent high performance in the subject of Install and Repair Fire Detector System, it has been the second-best succeeded subject after Practical ELS for two of the three years, it also slight increased from 92.89% in 2019 to 93.1% in 2021 and added more to 99.2% in 2022. As

with all practical subjects, Practical ELS is the subject with the highest percentage of passing students in all three years, scoring 99.12%, 99.85% and 100% in 2019, 2021 and 2022 respectively. Overall, the data suggests that the students' performance in the Electronic Services trade has improved over the years, indicating that the teaching methods and curriculum might be effective in enhancing the students' learning outcomes.

Table 102: Pass rate in ELS trade by Gender

ELS		2019		2021		2022	
		No.	%	No.	No.	No.	%
Apply Basic Microcontroller	Female	69	38.55	202	84.52	162	99.39
	Male	266	39.18	561	85.78	696	98.17
Maintain Electronic Display	Female	115	64.25	224	93.72	159	97.55
	Male	501	73.78	620	94.80	631	89.12
Fundamentals of Electronics	Female	62	34.64	198	82.85	151	92.64
	Male	188	27.69	544	83.18	587	82.79
Install and repair CCTV camera system	Female	120	67.04	200	83.68	163	100
	Male	488	71.87	544	83.18	696	98.17
Install and Repair Fire Detector System	Female	168	93.85	222	92.89	163	100
	Male	629	92.64	605	92.51	702	99.01
Practical ELS	Female	178	99.44	239	100.00	163	100
	Male	673	99.12	653	99.85	709	100

Table 102 presents the pass rates for both genders increased over time, with some variation across subjects. In 2019, male students generally had slightly higher pass rates than female students in most subjects, except for "Fundamentals of Electronics" and "Install and Repair Fire Detector System.". in 2021, the performance of males and Females was almost the same, with no difference greater than 1.5% in the passing rate of all subjects. However, in 2022, female students had higher pass rates than male students in most subjects, apart from "Practical ELS" in which both females and males passed at 100%. Analyzing subject by subject, in "Apply Basic Microcontroller," both male and female students showed a significant improvement in performance over time, with pass rates increasing from 38.55% and 39.18% in 2019 to 84.52% and 85.78% in 2021 academic year and then further to 99.39% and 98.17% in 2022 for female and male students, respectively. Both genders seem to perform at the same level in this subject evaluating the difference in pass rates that is less than 1% in all the three years.

In “Maintain Electronic Display,” both male and female students showed a significant improvement in performance over time, with pass rates increasing from 64.25% and 73.78% in 2019 to 93.72% and 94.80% in 2021 and further to 97.55% and 89.12% in 2022 for female and male students, respectively. Even though, males outperformed their female colleagues in 2019 and 2021 National Examinations, Female students reversed the situation and did way better than their male counterparts in 2022. In “Fundamentals of Electronics,” female students had a higher pass rate than male students in both 2019 at 34.64% female pass rate vs 27.69% male pass rate and in 2022 at 92.6% female pass rate vs 82.79% male pass rate. However, in 2021, the pass rates for male students very slightly surpassed those for female students, with 83.18% pass rate for male students and 82.85% for female students. In “Install and repair CCTV camera system,” both male and female students showed consistent performance over the years with slightly higher pass rates for male students than female in 2019 at 71.87% vs 67.04% but in the remaining two years, females marginally outperformed their male colleagues at 83.68% vs 83.18% and 100% vs 98.17% in 2021 and 2022 respectively. In “Install and Repair Fire Detector System,” both male and female students showed consistent and high performance over the years with slightly higher pass rates for female students than male in all the three years recording 93.85% females and 92.64% males pass rates in 2019, while in 2021, the percentage slightly decreased to 92.89% and 92.51% for female and males respectively. In 2022, there a recommendable improvement when all females passed the national examination at 100% and males passed at 99.01%. In the Practical ELS subject under the ELS trade, the pass rates for both genders remained consistently high across all three years where in 2019, 99.44% of female students and 99.12% of male students passed the Practical ELS subject. In 2021, all female students (100%) and 99.85% of male students passed the subject. In 2022, all female and male students passed the subject. Furthermore, the data show to be no significant gender differences in performance in this subject.

Table 103: Average score, SD & CV of scores in ELS

ELS		2019	2021	2022
Apply Basic Microcontroller	Mean	34.84	63.01	62.49
	SD	15.49	20.25	18.52
	VC	44.46	32.13	29.64
Maintain Electronic Display	Mean	52.02	73.64	50.29
	SD	19.23	17.81	17.04
	VC	36.97	24.18	33.88
Fundamentals of Electronics	Mean	31.83	48.86	47.22
	SD	15.81	18.83	22.90
	VC	49.66	38.53	48.51

Install and repair CCTV camera system	Mean	48.96	61.79	72.13
	SD	16.61	20.99	20.33
	VC	33.93	33.97	28.18
Install and Repair Fire Detector System	Mean	67.18	79.81	77.59
	SD	16.43	16.89	20.23
	VC	24.46	21.16	26.07
Practical ELS	Mean	92.50	93.25	93.96
	SD	6.04	4.98	4.39
	VC	6.53	5.34	4.67

Table 103 presents the mean score, standard deviation (SD), and variation coefficient (VC) of students' performance in different subjects under the trade of Electronic Services (ELS) across three years: 2019, 2021, and 2022. The mean score represents the average performance of the students in each subject, while the standard deviation measures how much the scores vary from the mean. The variation coefficient is a relative measure of dispersion that shows the standard deviation as a percentage of the mean. For the subject "Apply Basic Microcontroller," the mean score of students increased from 34.84 in 2019 to 63.01 in 2021 and remained almost the same at 62.49 in 2022. The standard deviation also increased from 15.49 in 2019 to 20.25 in 2021 and slightly decreased to 18.52 in 2022, indicating that the scores of students became less dispersed. The variation coefficient also decreased over the years from 44.46 to 32.13 and down to 29.64 in 2019, 2021 and 2022 respectively, indicating a more consistent performance of students as time goes on. For "Maintain Electronic Display," subject the mean score increased from 52.02 in 2019 to 73.64 in 2021 and then experience a sharp decrease to 50.29 in 2022. The standard deviation decreased over the years from 19.23 to 17.81 and the 17.94 in 2019, 2021 and 2022 respectively. However, the variation coefficient was inconsistent, starting at 36.97% in 2019, decreasing to 24.18 in 2021 but increasing again to 33.88 in 2022, indicating an inconsistency in student marks dispersion. For "Fundamentals of Electronics," the mean score increased from 31.83 in 2019 to 48.86 in 2021 and then slightly decreased to 47.22 in 2022. The standard deviation increased over the years from 15.81 to 18.83 and further to 22.90 in 2019, 2021 and 2022 respectively, indicating that the scores of students became more dispersed. The variation coefficient decreased from 49.66 in 2019 to 38.53 in 2021 but unfortunately increased again to 48.51 in 2022, indicating a higher dispersion of students' performance. For "Install and repair CCTV camera system," the mean score increased from 48.96 in 2019 to 61.79 in 2021 and then increased again to 72.13 in 2022. The standard deviation increased from 16.61 in 2019 to 20.99 in 2021 and almost stayed the same at 20.33 in 2022 indicating that the scores of students became a little bit more dispersed over the years. However, the variation coefficient remained relatively stable over the years

ranging between 28.18 recorded in 2022 and 33.97 of 2021, indicating a similar level of dispersion of students' performance.

For "Install and Repair Fire Detector System," the mean score increased from 67.18 in 2019 to 79.81 in 2021 and then remained almost the same at 77.59 in 2022. The standard deviation slightly increased over the years from 16.43 in 2019 to 16.89 in 2021 and then 20.23 in 2022, indicating that the dispersion of students' scores was slightly stable. The variation coefficient portrayed an unstable trend, decreasing to 21.16 in 2021 from 24.46 from the previous year of 2019 yet increased to 26.07 the following year of 2022, however the difference is minimal, and we can see a consistent performance of students across the years. For "Practical ELS," the mean score remained consistently high across the years, with a slight increase from 92.50 in 2019 to 93.25 in 2021 and then further to 93.96 in 2022. The standard deviation decreased over the years, indicating that the scores of students became less dispersed due to the drop from 6.04 recorded in 2019 to 4.98 in 2021 and further down to 4.39 in 2022. The variation coefficient also decreased over the years from 6.53 to 5.34 and further to 4.67 in 2019, 2021 and 2022 respectively, demonstrating improvement in the performance of students in this subject as time goes on. In summary, the performance of students in different subjects under the trade of Electronic Services (ELS) varied across the years, with some subjects showing an improvement in mean scores and consistency of performance, while others showed a decrease in mean scores and an increase in the dispersion of performance.

Table 104: Pass rate in ELS by school ownership

ELS		2019		2021		2022	
		No.	%	No.	%	No.	%
Apply Basic Microcontroller	GA	93	87.74	88	100	79	100
	PR	190	28.4	562	83.9	619	97.79
	PU	52	82.5	102	99	112	100
Maintain Electronic Display	GA	105	99.1	88	100	79	100
	PR	448	66.9	626	93.4	632	100
	PU	63	100.00	103	100	112	100
Fundamentals of Electronics	GA	83	78.30	88	100	79	100
	PR	121	18.06	541	80.7	548	86.57
	PU	46	73.02	101	98.1	107	95.54
Install and repair CCTV camera system	GA	105	99.06	88	100	79	100
	PR	441	65.82	535	79.9	633	100
	PU	62	98.41	100	97.1	112	100

Install and Repair Fire Detector System	GA	105	99.06	88	100	79	100
	PR	616	91.94	610	91	627	99.05
	PU	63	100	103	100	112	100
Practical ELS	GA	105	99.06	88	100	79	100
	PR	666	99.4	669	99.9	633	100
	PU	63	100	103	100	112	100

Based on the data in the Table 104 the pass rates for different subjects by school ownership types for the years 2019, 2021, and 2022. For the subject “Apply Basic Microcontroller,” the pass rates for GA schools were consistently high, with a pass rate of 87.74% in 2019 and 100% in the following years. PR schools had a pass rate of 28.4% in 2019, which increased to 83.9% in 2021 and further increased to 97.79% in 2022. PU schools had a pass rate of 82.5% in 2019, which improved to 99% in 2021 and remained at 100% in 2022. For the subject “Maintain Electronic Display,” the pass rates for GA and PU schools were consistently high at 99.1% and 100%, respectively, across all three years. The pass rate for PR schools increased from 66.9% in 2019 to 93.4% in 2021 and reached 100% in 2022. For the subject “Fundamentals of Electronics,” GA schools had a pass rate of 78.30% in 2019, which increased to 100% in the following years. PR schools had a pass rate of 18.06% in 2019, which significantly improved to 80.7% in 2021 and further increased to 86.57% in 2022. PU schools had a pass rate of 73.02% in 2019, which improved to 98.1% in 2021 but slightly decreased to 95.54% in 2022. For the subject “Install and repair CCTV camera system,” the pass rates for GA and PU schools were consistently high at 99.06% and 100%, respectively, across all three years. The pass rate for PR schools increased from 65.82% in 2019 to 79.9% in 2021 and reached 100% in 2022. For the subject “Install and Repair Fire Detector System,” the pass rates for GA and PU schools were consistently high at 99.06% and 100%, respectively, across all three years. The pass rate for PR schools was high at 91.94% in 2019, slightly decreased to 91% in 2021, but then increased to 99.05% in 2022. For the subject “Practical ELS,” all schools had a pass rate of 100% in all three years. In summary, the pass rates for all subjects and school ownership types improved or remained high across the three years. PU schools consistently had the highest pass rates, followed by GA schools, while PR schools had the lowest pass rates, but with significant improvements in 2021 and 2022.

3.5.12 Food and Beverage Services (FBS) Trade

Table 105 shows the total number of students who attended the National Exams for the trade of Food and Beverage Services (FBS) in six different subjects across for 2019, 2021 and 2022.

Table 105: Number of students registered in the FBS trade

Subjects	2019	2021	2022
Bar operations	75	54	63
Planning a catering	75	54	63
Practical FBS	75	54	63
Prepare and provide beverages	75	54	63
Processing financial transaction	75	54	63
Providing quality customer care services	75	54	63

In 2019, a total of 75 students attended the National Exams for each of the six subjects. However, in 2021, the total number of students who attended the National Exams for each subject decreased to 54 in both years and slightly increased to 63 in 2022. This suggests that there was a significant drop in the number of students who pursued the FBS trade during these recent two years. It is worth noting that the number of students who attended the National Exams for each subject remained the same in each year across the three years, which indicates that there was no significant change in the popularity of specific subjects within the FBS trade. Overall, the table indicates that the total number of students who attended the National Exams for the FBS trade decreased in 2021 and 2022 compared to 2019, possibly due to external factors such as the COVID-19 pandemic, economic conditions, or other factors.

Table 106: Pass rate trend FBS trade Core subjects

FBS	2019		2021		2022	
	No.	%	No.	%	No.	%
Bar operations	23	30.7	26	48.1	63	100
Providing quality customer care services	22	29.33	42	77.8	62	98.41
Processing financial transaction	13	17.33	43	79.6	56	88.89
Planning a catering	33	44	42	77.8	63	100
Prepare and provide beverages	11	14.67	38	70.4	62	98.41
Practical FBS	75	100	51	94.4	63	100

Table 106 presents the performance trend of students in the Food and Beverage Services trade over a three-year period, from 2019 to 2022. The data includes the frequency and percentage of students who passed the National exam in each subject of the trade. Overall, there is a notable improvement in student performance from 2019 to 2022, with an increase in pass rates across all subjects. Looking at the performance of each subject, the data shows that Bar Operations recorded a 30.7% pass rate in 2019, this improved slightly to 48.1% in 2021 (the lowest past rate in that academic year) and then surprisingly hit 100% in 2022 showing students understanding of this subject over time. Providing quality customer care services also had a notable improvement, from 29.33% in 2019 to 77.8% in 2021 and more to 98.41% in 2022. Processing financial transactions also improved significantly from a low performance of 17.33% second lowest pass rate in 2019 to a recommendable 79.6% pass rate in 2021 and then to 88.89% in 2022. Planning a catering was the second-best succeeded course after practical FBS in 2019 at 44%, then increased to 77.8% in 2021 and recorded an impressive 100% pass rate in 2022. This indicates that students have a good level of command in this subject. The subject of Prepare and Provide beverages had the lowest pass rate in 2019 with only 14.67%. However, it increased significantly to 70.4% in 2021 (second lowest rate) and further to 98.41%, in 2022, still the second lowest pass rate in that year.

Practical FBS is the subject mostly succeeded by students in the Food and Beverage Service trade across the three years, having recorded 100% pass rate both in 2019 and 2022 academic years and a slight decrease to 94.4% in 2021 yet still being the subject passed by the highest percentage of students in that year. Overall, the data suggests there is still room for improvement in the subjects of processing financial transactions and the subject of Prepare and Provide beverages because their pass rates are still relatively low compared to others.

Table 107: Pass rate in FBS by gender

FBS		2019		2021		2022	
		No.	%	No.	%	No.	%
Bar operations	Female	16	25.40	24	50.00	52	100
	Male	7	58.33	2	33.33	11	100
Providing quality customer care services	Female	16	25.40	37	77.08	51	98.08
	Male	6	50.00	5	83.33	11	100
Processing financial transaction	Female	12	19.05	38	79.17	45	86.54
	Male	1	8.33	5	83.33	11	100
Planning a catering	Female	26	41.27	37	77.08	52	100
	Male	7	58.33	5	83.33	11	100

Prepare and provide beverages	Female	9	14.29	34	70.83	52	100
	Male	2	16.67	4	66.67	11	100
Practical FBS	Female	63	100.00	46	95.83	52	100
	Male	12	100.00	5	83.33	11	100

Table 107 shows the percentage of students who passed each subject under the trade of Food and Beverage Services (FBS) for the years 2019, 2021, and 2022, broken down by gender. Here's a breakdown of the analysis: Bar operations: In 2019, 25.4% of female students passed compared to 58.3% of male students. In 2021, the pass rate for female students increased to 50%, while the pass rate for male students dropped to 33.3%. In 2022, all female and male students passed the subject. This shows that no specific gender has dominated the other with respect to student's performance in this subject. Providing quality customer care services: In 2019, 25.4% of female students passed compared to 50% of male students. In 2021, the pass rate for female students increased to 77.08%, while the pass rate for male students increased to 83.33%. In 2022, 98.08% female students passed the exam while all male students passed the subject at 100%. In this subject male student consistently outperformed their female colleagues.

Processing financial transaction: In 2019, 19.05% of female students passed compared to 8.33% of male students. In 2021, the pass rate for female students jumped to 79.17%, while the pass rate for male students exceptionally increased to 83.33%. In 2022, the pass rate for female students increased slightly to 86.54%, while all male students passed the subject. The data suggest that male students are likely to pass this subject more than their female counterparts. Planning a catering: In 2019, 41.27% of female students passed compared to 58.33% of male students. In 2021, the pass rate for female students increased to 77.08%, while the pass rate for male students increased to 83.33%. In 2022, all female and male students passed the subject showing progressive mastery of the subject by both genders. Prepare and provide beverages: In 2019, 14.29% of female students passed compared to 16.67% of male students. In 2021, the pass rate for female students increased significantly to 70.83%, while the pass rate for male students increased to 66.67%. In 2022, all female and male students passed the subject. Both Females and Males recorded a positive trend in their performance. For Practical FBS: In 2019 and in 2022, all students (female and male) passed the subject. A small drop was observed in 2021 when the pass rate for female students was 95.83%, while that for male students was 83.33%, suggesting that females did better than male students in this academic year. Overall, the data suggests that male students performed relatively well in most subjects under the FBS trade, however it's worth noting that the pass rates for both female and male students improved significantly in most subjects from 2019 to 2021 and remained high in 2022.

Table 108: Average score, SD & CV of scores in FBS trade

FBS		2019	2021	2022
Bar operations	Mean	30.32	54.55	77.44
	SD	18.14	23.62	15.45
	VC	59.84	43.29	19.95
Providing quality customer care services	Mean	29.77	63.35	74.05
	SD	18.96	22.92	20.26
	VC	63.68	36.18	27.36
Processing financial transaction	Mean	27.04	47.20	51.70
	SD	13.78	17.12	23.41
	VC	50.98	36.27	45.28
Planning a catering	Mean	38.41	61.39	76.05
	SD	20.00	19.31	17.88
	VC	52.07	31.46	23.51
Prepare and provide beverages	Mean	22.64	56.14	65.95
	SD	15.72	22.61	18.73
	VC	69.43	40.28	28.39
Practical FBS	Mean	94.35	90.92	94.33
	SD	4.85	5.40	3.82
	VC	5.14	5.94	4.05

Table 108 shows the mean score, standard deviation (SD), and variation coefficient (VC) for each subject under the trade of Food and Beverage Service (FBS) across three academic years: 2019, 2021, and 2022. The mean score represents the average performance of the students in each subject, while the standard deviation measures how much the scores vary from the mean. The variation coefficient is a relative measure of dispersion that shows the standard deviation as a percentage of the mean. Overall, we can observe that the mean scores for each subject tend to increase over the years, indicating an improvement in students' performance. However, there are some variations in the standard deviation and variation coefficient that need to be analyzed. For the subject of Bar Operations, we can see that there was a significant increase in the mean score from 30.32 in 2019 to 54.55% in 2021 and further to 77.44 in 2022. The standard deviation also increased from 18.14 in 2019 to 23.62 in 2021 and then decreased to 15.45 in 2022, indicating slight inconsistency in students' marks scattering. On a positive note, the variation coefficient decreased significantly from 59.84 in 2019 to 43.29 in 2021 and down to 19.95 in 2022, indicating that the dispersion of scores relative to the

mean decreased in this period. For the Providing Quality Customer Care Services subject, we can see that there was a considerable increase in the mean score from 29.77 in 2019 to 63.35 in 2020/2012 and then to 74.05 in 2022. The standard deviation increased to 22.92 in 2021 from 18.96 in 2019 and then decreased to 20.26 in 2022. Desirably, the variation coefficient shows a different trend, increasing from 63.68 in 2019 to 36.18 in 2021 and then down to 27.36 in 2022, indicating an increase in the dispersion of scores relative to the mean. For Processing Financial Transactions, we can see that there is a slight increase in the mean score from 27.04 in 2019 to 47.20 in 2021 and then to 51.70 in 2022. Unfortunately, the standard deviation also increased from 13.78 in 2019 to 17.12 in 2021 and then to 23.41 in 2022. We can also observe a discrepancy in the variation coefficient which decreased to 36.27 in 2021 from 50.98 in 2019 and then suddenly increased to 45.28 in 2022, indicating a relatively high dispersion of scores relative to the mean. For Planning a Catering, we can see that there was a significant increase in the mean score from 38.41 in 2019 to 61.39 in 2021 and then to 76.05 in 2022. The standard deviation decreased from 20.00 in 2019 to 19.31 in 2021 and then further down to 17.88 in 2022, indicating a reduction in the variation of scores. The variation coefficient also decreased from 52.07 recorded in 2019 to 31.46 in 2021 and then went down again to 23.51 in 2022, indicating a decrease in the dispersion of scores relative to the mean. For Prepare and Provide Beverages, we can see that there was a considerable increase in the mean score from 22.64 in 2019 to 56.14 in 2021 and then to 65.95 in 2022. The standard deviation also increased from 15.72 in 2019 to 22.61 in 2021 and then slightly decreased to 18.73 in 2022. On a Positive note, the variation coefficient decreased from 69.43 in 2019 to 40.28 in 2021 and then further down to 28.39 in 2022, indicating a relatively low dispersion of scores relative to the mean. Looking at the data for "Practical FBS," we can see that the mean score was highest in 2019 (94.35) and lowest in 2021 (90.92) but increased again in 2022 (94.33). The SD was lowest in 2022 (3.82) and highest in 2021 (5.40), while the SD was recorded at 4.85 in 2019. The variation coefficient (VC) was also lowest in 2022 (4.05) and highest in 2021 (5.94) and it had recorded 5.14 in 2019 indicating the relative variability of the scores. Overall, the data suggests that students in Practical FBS have performed relatively consistently over the three years, with a slight drop in performance in 2021 that was then recovered in 2022. The low standard deviation and variation coefficient in the most recent year suggest that scores were less dispersed and more consistent across the student population.

Table 109: Pass rate in FBS trade by school ownership

FBS		2019		2021		2022	
		No.	%	No.	%	No.	%
Bar operations	GA			6	100	14	100
	PR	23	30.7	20	41.7	48	100
	PU						
Providing quality customer care services	GA			6	100	14	100
	PR	22	29.3	36	75	47	97.92
	PU						
Processing financial transaction	GA			6	100	14	100
	PR	13	17.33	37	77.1	41	85.42
	PU						
Planning a catering	GA			6	100	14	100
	PR	33	44.00	36	75	48	100
	PU						
Prepare and provide beverages	GA			6	100	14	100
	PR	11	14.67	32	66.7	47	97.92
	PU						
Practical FBS	GA			6	100	14	100
	PR	75	100	45	93.8	48	100
	PU						

From the data presented in table 109, it can be seen that there were no students in public TVET schools across the three years and also in 2019, government aided schools did have students in FBS. However, looking at the pass rate in Private schools, for Bar Operations, in Government Aided schools in 2021 and 2022, the pass rate was 100%. In PR, the pass rate was 30.7% in 2019, which increased to 41.7% in 2021 and then to 100% in 2022. There is no data available for PU for this subject. For Providing Quality Customer Care Services: In GA in 2021 and 2022, the pass rate was 100%. In PR, the pass rate was 29.3% in 2019, which increased to 75% in 2021 and then to 97.92% in 2022. For Processing Financial Transaction: In GA in 2021 and 2022, the pass rate was 100%. In PR, the pass rate was 17.33% in 2019, which increased to 77.1% in 2021 and then to 85.42% in 2022. For Planning a Catering: In GA in 2021 and 2022, the pass rate was 100%. In PR, the pass rate was 44% in 2019, which increased to 75% in 2021 and then to 100% in 2022. For Prepare and Provide Beverages: In GA in 2021 and 2022, the pass rate was 100%. In PR, the pass rate was 14.67% in 2019, which increased to 66.7% in 2021 and then to 97.92% in 2022.

in 2022. For Practical FBS: In GA in 2021 and 2022, the pass rate was 100%. In PR, the pass rate was 100% in all three years. Overall, we can see that the pass rates have generally improved over the years for most subjects and school ownerships. The highest pass rates are generally seen in the public schools (PU) for which data is available, followed by private schools (PR). It is also notable that in most cases, the pass rates have reached or exceeded 100% in the latest year (2022), which may indicate either an improvement in teaching and learning or a change in assessment methods. However, it is important to note that the data is limited, and it may not provide a comprehensive picture of the performance of schools and students in the respective subjects.

3.5.13 Football (FOB) Trade

Table 110 shows the total number of students who attended the Football (FOB) National Exams in six subjects across three academic years: 2019, 2021, and 2022. Table.... indicates that in the year 2019, 44 students attended the FOB National Exams in each of the six subjects.

Table 110: Number of students registered in FOB trade

Subjects	2019	2021	2022
Apply technics and tactics of football player	44	27	0
Developing a football player skills	44	27	0
Perform football rules and regulations	44	27	0
Player's physical fitness development	44	27	0
Practical FOB	44	27	0
Preparing football competition	44	27	0

In 2021, the number of students decreased to 27 for each subject. Interestingly, in the most recent academic year (2022), no student attended the FOB National Exams in any of the six subjects. The data suggests a declining trend in the number of students attending FOB National Exams in the last two academic years. There could be various reasons for this decline, such as decreased interest in the field of football or changes in the curriculum. However, without further context, it is difficult to draw definitive conclusions about the reasons for the decline in attendance.

Table 111: Pass rate trend in Football trade Core subjects

FOB	2019		2021	
	No.	%	No.	%
Perform football rules and regulations	43	97.7	25	92.6
Developing a football player skills	42	95.5	21	77.8
Apply technics and tactics of football player	44	100.0	24	88.9
Player's physical fitness development	44	100.0	23	85.2
Preparing football competition	44	100.0	22	81.5
Practical FOB	44	100.0	26	96.3

Table 111 shows the trend of students' performance in two academic years, 2019 and 2021. As it is indicated, the trend of performance in all core subjects in football trade was negative over the two years 2019 and 2021. Based on the information provided in the table above, we can see that the pass rate for the subject "Perform Football Rules and Regulations" decreased from 97.7% in 2019 to 92.6% in 2021. This indicates that there was a decrease in the number of students who passed the subject in the latter year. The pass rate for Developing a football player skills subject decreased from 95.5% in 2019 to 77.8% in 2021. The table above indicates also that there is a significant decrease in the pass rate for the subjects "Apply techniques and tactics of football players", "Player's physical fitness development" and "Preparing football competition" respectively from 100% in 2019 to 88.9%, 85.2% and 81.5% in 2021. There is also a slight decrease in the pass rate for the subject "Practical FOB" from 100.0% to 96.3%. In conclusion, identifying the cause(s) of the decrease in pass rate in different subjects between 2019 and 2021 requires a thorough analysis of the curriculum, teaching methods, student population, and external factors that could have influenced student performance. By pinpointing the root causes, appropriate interventions can be implemented to improve the pass rate in the future.

Table 112: Pass rate in FOB trade by Gender

FOB		2019		2021	
		No.	%	No.	%
Apply technics and tactics of football player	Female	17	100.0	NA	NA
	Male	27	100.0	29	85.3
Developing a football player skills	Female	16	94.1	NA	NA
	Male	26	96.3	23	67.6
Perform football rules and regulations	Female	17	100.0	NA	NA
	Male	26	96.3	30	87.9
Player's physical fitness development	Female	17	100.0	NA	NA
	Male	27	100.0	27	79.4
Preparing football competition	Female	17	100.0	NA	NA
	Male	27	100.0	26	75.8
Practical FOB	Female	17	100.0	NA	NA
	Male	27	100.0	32	87.5

Basing on the data in the Table 112 it appears that the pass rate of male candidates has decreased in six different examinable core subjects in FOB trade: Apply technics and tactics of football player, developing a football player skill, perform football rules and regulations, Player's physical fitness development, Preparing football competition, and Practical FOB. In Apply techniques and tactics of football player subject, the pass rate for male candidates decreased from 100% in 2019 to 85.3% in 2021. It's concerning to observe that there was also a significant decrease in performance among male candidates in developing football player skills, dropping from 96.3% in 2019 to 67.6% in 2021. In addition, the table also shows a significant drop in the pass rate for male candidates in the Perform football rules and regulations subject from 96.3% in 2019 to 87.9% in 2021. In Player's physical fitness development, the pass rate for male candidates dropped from 100% in 2019 to 79.4% in 2021. Similarly, the pass rate for male candidates in Preparing football competition also decreased from 100% in 2019 to 75.8% in 2021. Finally, the pass rate for male candidates in Practical FOB dropped from 100% in 2019 to 87.5% in 2021. It is possible that this subject requires a higher level of physical ability and skill, which may have been more challenging for male candidates in 2021.

There could be various reasons for this decline, such as: Difficulty level: It is possible that the difficulty level of the subject increased in 2021, leading to a lower pass rate. This could be due to changes in the exam format, content, or scoring criteria. Pandemic-related disruptions: The COVID-19 pandemic caused significant disruptions in education, including delays in exams, reduced teaching hours,

and changes in teaching methods. These disruptions could have impacted male candidates' ability to learn and perform well in different subjects. Other factors: Other factors such as inadequate preparation, lack of interest, or personal issues could have contributed to the decline in male candidates' pass rate. Overall, the decrease in pass rates for male candidates in these subjects suggests that there may be some factors that are hindering their ability to perform well. It would be important to investigate these factors further to develop strategies to help male candidates improve their performance in these subjects.

Table 113: Average score, SD &VC of scores in FOB

FOB		2019	2021
Apply technics and tactics of football player	Mean	75.4	66.2
	SD	11.5	15.9
	VC	15.2	24.0
Player's physical fitness development	Mean	68.9	63.3
	SD	8.7	19.1
	VC	12.6	30.2
Preparing football competition	Mean	82.3	72.9
	SD	8.7	21.5
	VC	10.6	29.5
Developing football player skills	Mean	73.9	63.0
	SD	14.6	22.5
	VC	19.8	35.7
Perform football rules and regulations	Mean	67.2	66.7
	SD	14.3	15.4
	VC	21.3	23.1
Practical FOB	Mean	96.1	93.6
	SD	1.4	2.6
	VC	1.4	2.8

Based on the given information presented in Table 113 there are some notable changes in the means and variation coefficients for different subjects related to football. In Apply techniques and tactics of football player, there was a significant decrease in the mean from 75.4 to 66.2 in 2019, and the variation coefficient increased from 15.2 to 24.0. This suggests that there was more variability in the scores in 2019, and overall performance in this subject decreased in 2021. Similarly, in Player's physical fitness development, there was a decrease in the mean score from 68.9 in 2019 to 63.3 in 2021, and the variation coefficient increased from 12.6

to 30.2. This indicates that not only did the mean score decrease, but there was also a much wider range of scores in 2021 compared to 2019. In Preparing football competition, the mean score decreased from 82.3 in 2019 to 72.9 in 2021, and the variation coefficient increased from 10.6 to 29.5. This suggests that there was a significant drop in performance in this subject, with a wider range of scores in 2021. In Developing football player skills, the mean score also decreased from 73.9 in 2019 to 63.0 in 2021, and the variation coefficient increased from 19.8 to 35.7. This indicates a decline in overall performance, with a greater degree of variability in scores in 2021. In Perform football rules and regulations, there was a slight decrease in the mean score from 67.2 in 2019 to 66.7 in 2021, but the variation coefficient increased from 21.3 to 23.1. This suggests that performance was relatively consistent between the two time periods, but there was slightly more variability in scores in 2021. Finally, in Practical FOB, there was a small decrease in the mean score from 96.1 in 2019 to 93.6 in 2021, and the variation coefficient increased from 1.4 to 2.8. This indicates that there was a slight decline in performance, but the range of scores remained relatively narrow. Overall, the data suggests that there were declines in performance across all subjects, with varying degrees of variability in scores. It may be useful to investigate the possible causes of these declines and take steps to address them to improve performance in the future

Table 114: Pass rate in FOB of students by school ownership

FOB		2019		2021	
		No.	%	No.	%
Apply technics and tactics of football player	PU	44	100.0	19	95.0
Developing a football player skills	PU	42	95.5	19	95.0
Perform football rules and regulations	PU	43	97.7	20	100.0
Player's physical fitness development	PU	44	100.0	19	95.0
Preparing football competition	PU	44	100.0	18	90.0
Practical FOB	PU	44	100.0	20	100.0

The data in above table show that there were changes in the pass rates for various aspects of football training between 2019 and 2021 in public schools. The pass rate for "Apply technics and tactics of football player" decreased from 100% in 2019 to 95% in 2021. This suggests that there may have been a decline in the students' ability to apply techniques and tactics in football during this period. Possible reasons for this decline could include changes in coaching methods or a lack of practice opportunities due to the COVID-19 pandemic. In contrast, the pass

rate for “Perform football rules and regulations” increased from 97.7% in 2019 to 100% in 2021. This suggests that the students’ understanding of football rules and regulations improved during this period. Possible reasons for this improvement could include increased emphasis on these aspects of the game during training, or more effective teaching methods. The pass rate for “Player’s physical fitness development” decreased from 100% in 2019 to 95% in 2021. This suggests that there may have been a decline in the students’ physical fitness levels during this period. Possible reasons for this decline could include a lack of practice opportunities due to the COVID-19 pandemic, or changes in students’ lifestyles that affected their fitness levels. Finally, the pass rate for “Preparing football competition” decreased from 100% in 2019 to 90% in 2021. This suggests that there may have been some issues with preparing students for football competitions during this period. Possible reasons for this decline could include changes in competition formats or scheduling, or a lack of preparation time due to the COVID-19 pandemic. Overall, the changes in pass rates for different aspects of football training suggest that there were some challenges in maintaining the same level of performance during the 2021 academic year compared to the previous year. However, it is important to note that the reasons for these changes are not clear and may be related to a variety of factors.

3.5.14 Food Processing (FOP) Trade

The pass rate and performance in FOP by gender, type of school and the total number of students who sat for the Food Processing (FOP) National Exams across the three years 2019, 2021, and 2022 are presented in this section.

Table 115: Number of students who sat for the trade of Food Processing (FOP)

Subjects	2019	2021	2022
Basics engineering sciences	111	257	267
Cassava flour and starch processing technology	111	257	267
Cereal grains processing technology	111	257	267
Coffee processing technology	111	257	267
Fruits and vegetables processing technology	111	257	267
Hygiene, waste management and food analysis	111	257	267
Meat processing technology	111	257	267
Milk processing technology	111	257	267
Practical FOP	111	257	267
Tofu technology and soymilk processing	111	257	267

As illustrated in Table 115, in 2019, there were 111 students who sat for the exam in each of the ten subjects. In 2021, the number of students who sat for the exam increased to 257 in each of the ten subjects, representing a significant increase compared to the previous year. In the last column, which represents the 2022 academic year, the number of students who sat for the exam is zero for all ten subjects. There could be several possible explanations for the sudden drop in attendance for the year 2022. One possibility the availability of alternative courses or career options, Food and Beverages Operations: (FPO). Overall, the data suggests that there was a significant increase in enrollment for the FOP trade from 2019 to 2021.

Table 116: Pass rate trend FOP trade Core subjects

FOP	2019		2021		2022	
Cereal grains processing technology	111	100.0	219	85.2	267	100.0
Meat processing technology	84	75.7	222	86.4	267	100.0
Coffee processing technology	96	86.5	216	84.0	267	100.0
Fruits and vegetables processing technology	106	95.5	233	90.7	266	99.6
Milk processing technology	93	83.8	211	82.1	267	100.0
Basics engineering sciences	109	98.2	225	87.5	260	97.4
Hygiene, waste management and food analysis	74	66.7	207	80.5	256	95.9
Tofu technology and soymilk processing	77	69.4	222	86.4	267	100.0
Cassava flour and starch processing technology	109	98.2	215	83.7	266	99.6
Practical FOP	111	100.0	257	100.0	267	100.0

According to Table 116 the performance of students in most of the examinable core subjects for Food Processing trade improved in the academic year 2022 compared to the previous years. The table shows that from 2021 to 2022 the percentage of students who passed the national exams increased in all the subjects. In contrast, only 3 out of 10 subjects registered an increase from 2019 to 2021. Based on the information provided in the table, there are both positive and negative trends in the pass rates of different subjects over the years 2019 to 2022. In Cereal grains processing technology subject, there was a perfect pass rate of 100% in 2019, which decreased to 85.2% in 2021 and then increased again to 100% in 2022. On the other hand, there was a positive trend in the pass rate of Meat processing technology subject. The pass rate was 75.7% in 2019, which increased to 86.4% in 2021 and further increased to 100% in 2022. In Coffee processing technology

subject, there was a slight decrease in the pass rate from 86.5% in 2019 to 84.0% in 2021, but it increased to 100% in 2022. Similarly, in Fruits and vegetables processing technology subject, the pass rate decreased from 95.5% in 2019 to 90.7% in 2021 and then increased to 99.6% in 2022. In Milk processing technology subject, the pass rate was 83.8% in 2019, which decreased to 82.1% in 2021, but it increased to 100% in 2022. In Basics engineering sciences subject, the pass rate decreased from 98.2% in 2019 to 87.5% in 2021, but it increased to 97.4% in 2022. There was a positive trend in the pass rate of Hygiene, waste management and food analysis subject. The pass rate was 66.7% in 2019, which increased to 80.5% in 2021 and then further increased to 95.9% in 2022. A positive trend was also observed in the pass rate of Tofu technology and soymilk processing subject. The pass rate increased from 69.4% in 2019 to 86.4% in 2021 and further increased to 100% in 2022. In Cassava flour and starch processing technology subject, the pass rate decreased from 98.2% in 2019 to 83.7% in 2021, but it increased to 99.6% in 2022. Finally, in Practical FOP, the students scored a pass rate of 100% over the three years, which indicates consistent performance in this subject.

Table 117: Pass rate in FOP Trade by Gender

FOP		2019		2021		2022	
		No.	%	No.	%	No.	%
Basics engineering sciences	Female	80	97.6	163	87.2	193	97.0
	Male	29	100.0	62	88.6	67	98.5
Cassava flour and starch processing technology	Female	80	97.6	154	82.4	198	99.5
	Male	29	100.0	61	87.1	68	100.0
Cereal grains processing technology	Female	82	100.0	155	82.9	199	100.0
	Male	29	100.0	64	91.4	68	100.0
Coffee processing technology	Female	70	85.4	151	80.7	199	100.0
	Male	26	89.7	65	92.9	68	100.0
Fruits and vegetables processing technology	Female	78	95.1	165	88.2	198	99.5
	Male	28	96.6	68	97.1	68	100.0
Hygiene, waste management and food analysis	Female	52	63.4	145	77.5	189	95.0
	Male	22	75.9	62	88.6	67	98.5
Meat processing technology	Female	57	69.5	158	84.5	199	100.0
	Male	27	93.1	64	91.4	68	100.0
Milk processing technology	Female	68	82.9	146	78.1	199	100.0
	Male	25	86.2	65	92.9	68	100.0

Tofu technology and soymilk processing	Female	54	65.9	158	84.5	199	100.0
	Male	23	79.3	64	91.4	68	100.0
Practical FOP	Female	82	100.0	187	100.0	199	100.0
	Male	29	100.0	70	100.0	68	100.0

Based on the information provided in the table 120, it appears that male students performed better than female students in all subjects for Food processing trade over the three years. It's also observed that there are some fluctuations in the pass rates for different subjects and between male and female students. In some subjects, such as Basics engineering sciences and Cassava flour and starch processing technology, both male and female students experienced a decrease in pass rates in 2021, but they were able to recover and achieve high pass rates in 2022. In other subjects, such as Cereal grains processing technology and Practical FOP, both male and female students consistently performed well with a pass rate of 100% over the three years.

There were also some notable differences in pass rates between male and female students in certain subjects, such as Meat processing technology and Fruits and vegetables processing technology. In Meat processing technology, the pass rate for male students was consistently higher than that of female students, but there was a positive trend of improvement for female students over the three years. In Fruits and vegetables processing technology, both male and female students showed a positive trend of improvement, but the pass rate for female students was consistently lower than that of male students. Overall, it seems that there are some variations in the performance of students across different subjects and genders, but the data also suggests that there are positive trends of improvement and consistent high performance in some subjects.

Table 118: Average score, SD & CV of scores in FOP trade

FOP		2019	2021	2022
Meat processing technology	Mean	50.2	55.4	70.8
	SD	14.6	13.7	13.8
	VC	29.0	24.8	19.4
Milk processing technology	Mean	67.2	61.5	66.0
	SD	19.0	17.0	16.5
	VC	28.3	27.6	24.9
Fruits and vegetables processing technology	Mean	56.4	69.5	64.2
	SD	11.2	14.1	16.3
	VC	19.8	20.3	25.4

Cassava flour and starch processing technology	Mean	66.2	63.0	58.9
	SD	12.6	13.5	13.4
	VC	19.1	21.5	22.8
Coffee processing technology	Mean	61.6	61.9	72.8
	SD	17.3	18.5	13.1
	VC	28.1	18.5	18.0
Cereal grains processing technology	Mean	69.2	63.9	88.0
	SD	11.3	14.1	10.3
	VC	16.3	22.2	11.7
Tofu technology and soymilk processing	Mean	50.5	69.6	77.7
	SD	16.7	17.3	12.7
	VC	33.0	24.9	16.4
Hygiene, waste management and food analysis	Mean	48.8	53.1	51.6
	SD	17.1	15.7	17.8
	VC	35.0	29.6	34.4
Basics engineering sciences	Mean	52.5	50.3	43.1
	SD	14.0	13.6	13.9
	VC	26.7	27.0	32.3
Practical FOP	Mean	96.4	96.6	94.2
	SD	3.8	3.0	4.2
	VC	3.9	3.1	4.5

It is noted from Table 118 that there were fluctuations in the mean scores, standard deviation, and coefficient of variation across all subjects. While some subjects showed improvements in performance, others declined. There were also fluctuations in the variability of performance across different years. In Meat Processing Technology: The mean score increased significantly from 50.2 in 2019 to 55.4 in 2021 and then to 70.8 in 2022, indicating an improvement in the processing technology. The standard deviation initially decreased from 14.6 in 2019 to 13.7 in 2021, but then increased slightly to 13.8 in 2022, indicating that the scores are becoming more spread out again. The coefficient of variation initially decreased from 29.0 in 2019 to 24.8 in 2021, and then decreased further to 19.4 in 2022, indicating that the variability of scores is decreasing relative to the mean score.

In Milk Processing Technology: The mean score decreased slightly from 67.2 in 2019 to 61.5 in 2021, but then increased again to 66.0 in 2022, indicating some fluctuations in the processing technology. The standard deviation initially decreased from 19.0 in 2019 to 17.0 in 2021, and then decreased further to 16.5 in

2022, indicating that the scores are becoming less spread out. The coefficient of variation initially decreased from 28.3 in 2019 to 27.6 in 2021, and then decreased further to 24.9 in 2022, indicating that the variability of scores is decreasing relative to the mean score. In Fruits and vegetables processing technology: The mean score increased from 2019 to 2021 but decreased in 2022. The standard deviation and coefficient of variation also increased in 2021 and 2022, indicating a greater spread of scores and more variability in performance. In Cassava flour and starch processing technology: The mean score decreased from 2019 to 2022. The standard deviation and coefficient of variation increased in 2021 and 2022, indicating greater variability in performance. In Coffee processing technology: The mean score increased from 2019 to 2021 and further increased in 2022. The standard deviation and coefficient of variation increased in 2021 but decreased in 2022, indicating a greater spread of scores in 2021 but less variability in 2022. In Cereal grains processing technology: The mean score decreased from 2019 to 2021 but increased significantly in 2022. The standard deviation and coefficient of variation increased in 2021 but decreased in 2022, indicating a greater spread of scores in 2021 but less variability in 2022.

In Tofu technology and soymilk processing; the mean score increased from 2019 to 2021 and further increased in 2022. The standard deviation and coefficient of variation also decreased in 2021 and 2022, indicating less variability in performance. In Hygiene, waste management, and food analysis; the mean score increased from 2019 to 2021 but decreased in 2022. The standard deviation and coefficient of variation increased in 2022, indicating a greater spread of scores and more variability in performance. In Basics engineering sciences: The mean score decreased from 2019 to 2022. The standard deviation and coefficient of variation increased in 2021 and 2022, indicating greater variability in performance. In Practical FOP; the mean score remained relatively stable over the three years but there were fluctuations in the standard deviation and coefficient of variation. The standard deviation decreased in 2021 and increased in 2022, while the coefficient of variation decreased in 2021 and increased in 2022. It is important to note that the provided data does not reveal any causal factors for these trends and further analysis may be required to understand the underlying factors contributing to these changes.

Table 119: Pass rate in FOP by school ownership

FOP		2019		2021		2022	
		No.	%	No.	%	No.	%
Basics engineering sciences	GA	52	98.1	86	92.5	78	98.7
	PR	21	100.0	60	100.0	61	96.8
	PU	36	97.3	79	76.7	119	96.8
Cassava flour and starch processing technology	GA	51	96.2	91	97.8	79	100.0
	PR	21	100.0	37	61.7	63	100.0
	PU	37	100.0	87	84.5	122	99.2
Cereal grains processing technology	GA	53	100.0	81	87.1	79	100.0
	PR	21	100.0	56	93.3	63	100.0
	PU	37	100.0	82	79.6	123	100.0
Coffee processing technology	GA	53	100.0	82	88.2	79	100.0
	PR	17	81.0	49	81.7	63	100.0
	PU	26	70.3	85	82.5	123	100.0
Fruits and vegetables processing technology	GA	50	94.3	91	97.8	79	100.0
	PR	20	95.2	52	86.7	63	100.0
	PU	36	97.3	90	87.4	122	99.2
Hygiene, waste management and food analysis	GA	37	69.8	82	88.2	76	96.2
	PR	1	4.8	49	81.7	61	96.8
	PU	36	97.3	76	73.8	117	95.1
Meat processing technology	GA	28	52.8	90	96.8	79	100.0
	PR	20	95.2	40	66.7	63	100.0
	PU	36	97.3	92	89.3	123	100.0
Milk processing technology	GA	52	98.1	85	91.4	79	100.0
	PR	4	19.0	45	75.0	63	100.0
	PU	37	100.0	81	78.6	123	100.0
Tofu technology and soymilk processing	GA	20	37.7	90	96.8	79	100.0
	PR	20	95.2	46	76.7	63	100.0
	PU	37	100.0	86	83.5	123	100.0
Practical FOP	GA	53	100.0	93	100.0	79	100.0
	PR	21	100.0	60	100.0	63	100.0
	PU	37	100.0	103	100.0	123	100.0

According to data in Table 119, it can be observed that the performance of students in various subjects varied across different school ownership types and academic years. In general, there were fluctuations in the pass rates of most subjects over the years, but in 2022, the pass rates were 100% in all three types of schools. However, there were some subjects such as Hygiene, waste management, food analysis, and Milk processing technology in private schools, where the pass rates were very low in 2019, at 4.8% and 19.0%, respectively. This indicates that students in private schools struggled with these subjects initially. But, the pass rates for these subjects showed a significant improvement over the years, with the pass rates increasing to 81.7% and 75% in 2021, and further increasing to 96.8% and 100% in 2022.

Overall, the improvement in pass rates in these subjects for private schools is commendable and suggests that the schools have taken steps to address the issues and improve the learning outcomes of the students. However, it is important to note that the table does not provide information on the specific measures taken by the schools to improve the performance of the students in these subjects. Further analysis is required to understand the reasons behind the fluctuations in the pass rates of different subjects across different school ownership types and academic years.

3.5.15 Forestry (FOR) Trade

The number of students who sat for the trade of Forestry (FOR) National Exams across the three years, general performance and pass rate, pass rate by gender and type of school were analysed . The Table below gives a summary of the number of students who sat for each subject in each of the three years.

Table 120: Number of students who sat for trade of Forestry (FOR)

Subjects	2019	2021	2022
Basic properties of wood assessment	120	111	57
Forest engineering	120	111	57
Forest exploitation	120	111	57
Forest management plan implementation	120	111	57
Forest protection	120	111	57
Practical FOR	120	111	57
Soil conservation	120	111	57
Tree nursery and forest plantation establishment	120	111	57

According to the statistics in the above table 120 students sat for each subject in 2019. In 2021, 111 students sat for the national exams, and in 2022 57 students sat

for the national examinations. Overall, the data suggests that there has been a significant decline in enrollment in the FOR trade from 2019 to 2022. This trend is observed across all subjects, indicating that it is not limited to a particular subject area which is a cause for concern for the future of this industry. The decline in the number of students pursuing the trade could have implications for the future of the FOR trade and the availability of skilled professionals in this field.

Table 121: Pass rate trend in FOR Core subjects

FOR	2019		2021		2022	
Basic properties of wood assessment	106	88.3	107	96.4	100	100.0
Forest management plan implementation	98	81.7	98	88.3	55	96.5
Forest engineering	94	78.3	107	96.4	55	96.5
Soil conservation	105	87.5	110	99.1	57	100.0
Forest exploitation	112	93.3	108	97.3	108	97.3
Forest protection	105	87.5	100	90.1	57	100.0
Tree nursery and forest plantation establishment	110	91.7	106	95.5	57	100.0
Practical FOR	120	100.0	111	100.0	57	100.0

Table 121 shows that there has been a positive trend in the performance of students in all subjects related to Forestry (FOR) over the years analyzed. The pass rate has generally increased across all subjects from 2019 to 2022. In Basic properties of wood assessment, the pass rate has increased from 88.3% in 2019 to 96.4% in 2021 and then to 100% in 2022. Similarly, in Forest management plan implementation, the pass rate increased from 81.7% in 2019 to 88.3% in 2021 and then to 96.5% in 2022. In Forest engineering, the pass rate has increased from 78.3% in 2019 to 96.4% in 2021 and then to 96.5% in 2022. In Soil conservation, the pass rate increased from 87.5% in 2019 to 99.1% in 2021 and then to 100% in 2022. In Forest exploitation, the pass rate has remained consistent at 97.3% in 2021 and 2022, with an increase from 93.3% in 2019. In Forest protection, the pass rate increased from 87.5% in 2019 to 90.1% in 2021 and then to 100% in 2022. Finally, in Tree nursery and forest plantation establishment, the pass rate has increased from 91.7% in 2019 to 95.5% in 2021 and then to 100% in 2022. The pass rate for Practical FOR has remained consistently at 100% over the three years analyzed.

Overall, the data suggests that there has been a positive trend in the performance of students in FOR-related subjects, with an increase in the pass rate for most subjects analyzed over the years.

Table 122: Pass rate in FOR by Gender

FOR		2019		2021		2022	
		No.	%	No.	%	No.	%
Basic properties of wood assessment	Female	49	84.5	59	93.7	37	100
	Male	57	91.9	48	100.0	20	100
Forest exploitation	Female	52	89.7	60	95.2	60	95.2
	Male	60	96.8	48	100.0	48	100.0
Forest engineering	Female	40	69.0	59	93.7	36	97.3
	Male	54	87.1	48	100.0	19	95
Forest management plan implementation	Female	42	72.4	50	79.4	37	100
	Male	56	90.3	48	100.0	18	90
Forest protection	Female	47	81.0	53	84.1	37	100
	Male	58	93.5	47	97.9	20	100
Soil conservation	Female	47	81.0	62	98.4	37	100
	Male	58	93.5	48	100.0	20	100
Tree nursery and forest plantation establishment	Female	51	87.9	58	92.1	37	100
	Male	59	95.2	48	100.0	20	100
Practical FOR	Female	58	100.0	63	100.0	37	100
	Male	62	100.0	48	100.0	20	100

Based on the data in Table 122, it appears that in most subjects, the pass rate for male students was higher than that of female students over the three years. However, there were two subjects, Forest engineering and Forest management plan implementation, where the pass rate for female students was higher than that of male students in 2022. Overall, it seems that there was a positive trend in performance based on gender in most of the subjects related to Forestry trade analysis. It is important to note that this data only provides a snapshot of performance by gender and does not necessarily indicate any inherent differences in ability or aptitude between male and female students. It is also possible that other factors, such as teaching methods or learning environments, could have influenced the results.

Table 123: Average score, SD & CV of scores in FOR trade

FOR		2019	2021	2022
Soil conservation	Mean	56.3	61.5	69.3
	SD	13.8	10.3	16.1
	VC	24.5	16.8	23.2
Tree nursery and forest plantation establishment	Mean	68.6	58.5	63.1
	SD	15.8	11.5	15.3
	VC	23.1	19.7	24.2
Basic properties of wood Assessment	Mean	59.2	61.9	73.0
	SD	17.0	13.4	13.4
	VC	28.7	21.7	18.4
Forest management plan implementation	Mean	56.0	51.8	48.1
	SD	18.0	11.5	17.1
	VC	32.2	22.2	35.6
Forest protection	Mean	61.1	56.6	63.5
	SD	16.7	11.9	12.3
	VC	27.3	21.0	19.4
Forest exploitation	Mean	62.9	65.7	45.5
	SD	14.4	11.9	13.7
	VC	22.8	18.2	30.1
Forest engineering	Mean	50.7	66.5	53.3
	SD	16.4	12.4	16.9
	VC	32.3	18.6	31.6
Practical FOR	Mean	92.7	95.2	93.5
	SD	3.8	2.6	1.7
	VC	4.1	2.7	1.8

The information given in the table126 indicates the performance of students in different subjects in Forestry trade basing on mean score, standard deviation and variation of coefficient over three years. The mean score, standard deviation, and coefficient of variation provide complementary information on the performance and variability of the scores. There are mixed trends in the performance of students in different subjects related to forestry trade over the three years. Some subjects showed an improvement in mean score and/or a decrease in standard deviation and/or variation of coefficient, while others showed a decline in mean score and/or an increase in standard deviation and/or variation of coefficient.

The mean score for Soil conservation has been increasing steadily over the years. It increased from 56.3 in 2019 to 61.5 in 2021 and then further increased to 69.3 in 2022. This suggests that there has been an improvement in Soil conservation performance over the years. The standard deviation of the scores has been fluctuating. It decreased from 13.8 in 2019 to 10.3 in 2021 and then increased to 16.1 in 2022. This suggests that there has been a greater spread of scores in 2022 compared to the previous year. The coefficient of variation (CV) is a measure of relative variability, which is the ratio of the standard deviation to the mean. A decreasing CV indicates a reduction in the variability of the scores. The CV for Soil conservation decreased from 24.5 in 2019 to 16.8 in 2021, indicating a reduction in the variability of scores. However, it increased to 23.2 in 2022, indicating that the variability of scores has increased.

The mean score in Tree nursery and forest plantation establishment decreased from 68.6 in 2019 to 58.5 in 2021, indicating a decline in performance during that period. However, it increased to 63.1 in 2022, indicating some improvement from the previous year. The standard deviation is a measure of the amount of variation or dispersion in the data. The decrease in standard deviation from 15.8 in 2019 to 11.5 in 2021 indicates that there was less variation in the data during that period. However, the standard deviation increased to 15.3 in 2022, indicating that there was more variation in the data during that period compared to the previous year. The coefficient of variation (CV) is a standardized measure of the dispersion of a probability distribution. It is calculated as the ratio of the standard deviation to the mean, expressed as a percentage. The decrease in the coefficient of variation from 23.1 in 2019 to 19.7 in 2021 indicates that the variation in the data was relatively smaller compared to the mean during that period. However, the coefficient of variation increased to 24.2 in 2022, indicating that the variation in the data was relatively larger compared to the mean during that period compared to the previous year.

The mean score in Basic properties of wood Assessment increased consistently over the past three years. The mean score increased from 59.2 in 2019 to 61.9 in 2021 and then increased further to 73.0 in 2022. The standard deviation of the scores, which measures the spread or variability of the data, decreased from 17.0 in 2019 to 13.4 in 2021, and remained constant at 13.4 in 2022. This suggests that the scores were less spread out in 2021 compared to 2019, and that the spread remained the same in 2022 compared to 2021. The coefficient of variation (CV), which is the ratio of the standard deviation to the mean expressed as a percentage, decreased from 28.7 in 2019 to 21.7 in 2021, and then increased slightly to 18.4 in 2022. A lower CV indicates that the data are less spread out around the mean, which suggests greater consistency in the scores. The given data shows a decreasing trend in the mean score of forest management plan implementation from 2019 to 2022, which indicates a decline in the overall effectiveness of forest management practices. Additionally, the standard deviation, which is a measure of the spread of data around the mean, decreased in 2021 but increased in 2022, which suggests that

the data points were more clustered around the mean in the former year but more dispersed in the latter year.

The coefficient of variation (CV), which is the ratio of the standard deviation to the mean expressed as a percentage, decreased from 32.2 in 2019 to 22.2 in 2021, indicating a reduction in the variability of the data. However, the CV increased to 35.6 in 2022, suggesting a higher degree of variability in the data in this period. From the given information, we can see that there have been fluctuations in the mean score, standard deviation, and coefficient of variation of forest protection over the three years. The mean score decreased from 61.1 in 2019 to 56.6 in 2021 and then increased to 63.5 in 2022. This indicates that there was a decrease in forest protection in 2021 compared to 2019, but it improved in 2022. The standard deviation increased from 16.7 in 2019 to 11.9 in 2021 and then increased to 12.3 in 2022. This means that there was less variability in the scores in 2021 and 2022 compared to 2019.

The coefficient of variation decreased from 27.3 in 2019 to 21.0 in 2021 and then decreased further to 19.4 in 2022. This indicates that the variability in the scores decreased over time and the scores became more consistent. Based on the given information, it seems that there has been a significant decrease in the mean score for Forest exploitation from 2019 to 2022. The mean score decreased from 62.9 in 2019 to 65.7 in 2021 and then dropped to 45.5 in 2022. This indicates a considerable decline in the quality of Forest exploitation in the last year. The standard deviation, on the other hand, shows a mixed trend. It decreased from 14.4 in 2019 to 11.9 in 2021, indicating that the data was more tightly clustered around the mean in 2021 compared to 2019. However, it then increased to 13.7 in 2022, which may indicate that the data points are more spread out from the mean in the most recent year. The coefficient of variation, which is a measure of the relative variability of the data, decreased from 22.8 in 2019 to 18.2 in 2021, indicating a decrease in the relative variability of the data. However, it then increased to 30.1 in 2022, which indicates that the relative variability of the data increased significantly in the last year. These measures suggest that there has been a significant decline in the quality of Forest exploitation, with a sharp decrease in mean score, an increase in standard deviation, and an increase in the coefficient of variation in the last year. It may be useful to investigate the causes of this decline and take measures to address them. The mean score in Forest Engineering increased significantly from 50.7 in 2019 to 66.5 in 2021, which indicates an improvement in the performance of the students. However, in the following year (2022), the mean score decreased to 53.3, which suggests a decline in performance compared to the previous year. The standard deviation is a measure of how spread out the data is, and it provides information on the variability of the scores.

In Forest Engineering, the standard deviation decreased from 16.4 in 2019 to 12.4 in 2021, which indicates a decrease in the variability of the scores. However, in the following year (2022), the standard deviation increased to 16.9, which suggests an increase in the variability of the scores compared to the previous

year. The coefficient of variation (CV) is a relative measure of variability that is useful for comparing data sets with different means and standard deviations. The CV decreased from 32.3 in 2019 to 18.6 in 2021, which indicates a decrease in the relative variability of the scores. However, in the following year (2022), the CV increased to 31.6, which suggests an increase in the relative variability of the scores compared to the previous year. The increase in mean score and decrease in standard deviation and CV in 2021 suggest an improvement in performance and a decrease in variability, respectively. However, the decrease in mean score and increase in standard deviation and CV in 2022 suggest a decline in performance and an increase in variability, respectively.

The mean score for Practical FOR increased from 92.7 in 2019 to 95.2 in 2021, which indicates an improvement in performance. However, the mean score then decreased to 93.5 in 2022, indicating a decline in performance compared to the previous year. The standard deviation, which measures the spread of the data around the mean, decreased from 3.8 in 2019 to 2.6 in 2021 and then decreased further to 1.7 in 2022. This suggests that the data in the later years was less variable than in 2019, which could mean that students were performing more consistently. The coefficient of variation (CV), which is the standard deviation divided by the mean, is a measure of relative variability. The CV decreased from 4.1 in 2019 to 2.7 in 2021 and decreased further to 1.8 in 2022. This suggests that the relative variability in the data decreased over time, which could indicate greater consistency in student performance. The data suggests that there was an improvement in Practical FOR mean score in 2021, but this was not sustained in 2022. However, the variability in student performance decreased over time, which could be an encouraging sign for future years

Table 124: Pass rate in FOR by school ownership

FOR		2019		2021		2022	
		No.	%	No.	%	No.	%
Basic properties of wood assessment	GA	32	71.11	46	97.87	46	97.87
	PU	74	98.67	61	95.31	61	93.75
Forest exploitation	GA	41	91.11	46	97.87	46	97.87
	PU	71	94.67	62	96.88	62	96.88
Forest engineering	GA	30	66.67	46	97.87	46	97.87
	PU	64	85.33	61	95.31	61	96.88
Forest management plan implementation	GA	33	73.33	42	89.36	42	97.87
	PU	65	86.67	56	87.50	56	95.31
Forest protection	GA	35	77.78	44	93.62	44	93.62
	PU	70	93.33	56	87.50	56	87.50

Soil conservation	GA	34	75.56	46	97.87	46	97.87
	PU	71	94.67	64	100.00	64	100.00
Tree nursery and forest plantation establishment	GA	37	97.33	46	97.87	46	97.87
	PU	73	97.33	60	93.75	60	95.31
Practical FOR	GA	45	100	47	100	47	89.36
	PU	75	100	64	100	64	87.5

Table 124 above shows the frequency and percentage score for each of the courses in the Forestry program for the academic years 2019, 2021, and 2022 for both GA (Government-aided) and PU (Public) schools. Looking at the table, it can be observed that in the basic properties of wood assessment course, both GA and PU schools have consistently high pass rates, with a range of 71.1% to 97.87% over the three academic years.

Similarly, in the forest exploitation, forest engineering, soil conservation, and tree nursery and forest plantation establishment courses, both GA and PU schools have high pass rates with a range of 66.67% to 100% over the three academic years.

In the forest management plan implementation course, both GA and PU institutions had lower pass rates in the academic year 2019 compared to the following years, with pass rates ranging from 73.33% to 86.67%. However, in the academic year 2022, both GA and PU institutions had a higher pass rate of 97.87%.

In the forest protection course, both GA and PU institutions had a consistently high pass rate over the three academic years, with pass rates ranging from 77.78% to 93.62%.

In the practical FOR course, both GA and PU institutions had a 100% pass rate in the academic years 2019 and 2021. However, in the academic year 2022, the pass rate dropped to 89.36% for GA schools and 87.5% for PU schools.

In conclusion, the table shows that both GA and PU schools have consistently high pass rates in most of the courses, with only a few fluctuations in some courses. Overall, the pass rates have been encouraging and suggest a positive trend in the performance of the Forestry program over the years.

3.5.16 Hydropower Energy (HPE) Trade

Table 125 presents the total number of students who attended the Hydropower Energy (HPE) trade National Exams across three academic years, from 2019 to 2022. There were eight trades as indicated in the table.

Table 125: Number of students in HPE trade core subjects

Subjects	2019	2021	2022
Electrical generator and motors operations	15	16	7
Electrical static machines winding and rewinding	15	16	7
Electricity and electrical measurements	15	16	7
Fundamental of hydropower plant operations	15	16	7
Install and protect electrical circuits	15	16	7
Pneumatic and hydraulic systems	15	16	7
Practical HPE	15	16	7
Technical and electrical drawing	15	16	7

The data shows that there were 15 students who attended the exams in each subject in 2019. In 2021, the number of students attending the exams remained the same, with 16 students attending in each subject in both years. However, in 2022, the number of students attending the exams decreased to 7 in all eight subjects. Overall, the data suggests that there was a steady number of students attending the HPE National Exams in each subject from 2019 to 2022, with a small increase in 2021. However, the significant drop in attendance in 2022 may indicate a potential issue or change in the HPE program or industry. Further analysis and context are required to fully understand the reasons behind this drop.

Table 126: Pass rate trend in Hydropower Energy (HPE) in Core subjects

HPE	2019		2021		2022	
Electricity and electrical measurements	7	46.7	11	68.8	6	85.7
Electrical generator and motors operations	11	73.3	13	81.3	6	85.7
Fundamental of hydropower plant operations	15	100.0	13	81.3	7	100.0
Install and protect electrical circuits	12	80.0	13	81.3	6	85.7
Electrical static machines winding and rewinding	11	73.3	10	62.5	7	100.0
Pneumatic and hydraulic systems	4	26.7	11	68.8	7	100.0
Technical and electrical drawing	13	86.7	15	93.8	7	100.0
Practical HPE	15	100.0	16	100.0	7	100.0

Table 126 shows the percentage scores for various courses in HPE for the years 2019, 2021, and 2022. Looking at the table, we can see that: The course with the highest percentage score in all three years is “Practical HPE,” with a perfect score of 100%. This suggests that students performed well in the practical aspects of the course. “Fundamental of hydropower plant operations” also received high scores, with a perfect score of 100% in 2022, indicating that students have a good understanding of this topic. “Electricity and electrical measurements,” “Electrical generator and motors operations,” “Install and protect electrical circuits,” and “Electrical static machines winding and rewinding” all had varying scores across the three years. However, they generally received high scores, indicating that students performed well in these courses. “Pneumatic and hydraulic systems” received the lowest scores in 2019 and 2021, but improved significantly to a perfect score of 100% in 2022. This suggests that there may have been some changes to the course or teaching methods that improved student performance. Overall, it seems that students performed well in these HPE courses, with most courses receiving high scores.

Table 127: Pass rate in HPE by Gender

HPE		2019		2021		2022	
		No.	%	No.	%	No.	%
Electrical generator and motors operations	Female	1	33.3	2	100.0	1	100.0
	Male	10	83.3	11	78.6	5	83.3
Electrical static machines winding and rewinding	Female	1	33.3	1	50.0	1	100.0
	Male	10	83.3	9	64.3	6	100.0
Electricity and electrical measurements	Female	1	33.3	1	50.0	1	100.0
	Male	6	50.0	10	71.4	5	83.3
Fundamental of hydropower plant operations	Female	3	100.0	2	100.0	1	100.0
	Male	12	100.0	11	78.6	6	100.0
Install and protect electrical circuits	Female	2	66.7	1	50.0	1	100.0
	Male	10	83.3	12	85.7	5	83.3
Pneumatic and hydraulic systems	Female		0.0	2	100.0	1	100.0
	Male	4	33.3	9	64.3	6	100.0
Technical and electrical drawing	Female	2	66.7	2	100.0	1	100.0
	Male	11	91.7	13	92.9	6	100.0
Practical HPE	Female	3	100.0	2	100.0	1	100.0
	Male	12	100.0	14	100.0	6	100.0

Regarding Electrical generator and motors operations in the above table, the percentage scores for female candidates have improved from 33.3% in 2019 to 100% in 2021 and 2022. For male candidates, the percentage scores are consistently high, with 83.3% in 2019, 78.6% in 2021, and 83.3% in 2022. For Electrical static machines winding and rewinding, we can see that the percentage scores for female candidates have fluctuated from 33.3% in 2019 to 50% in 2021 and 100% in 2022. For male candidates, the percentage scores have decreased from 83.3% in 2019 to 64.3% in 2021 and increased to 100% in 2022. For Electricity and electrical measurements, we can see that the percentage scores for female candidates have improved from 33.3% in 2019 to 50% in 2021 and 100% in 2022. For male candidates, the percentage scores have consistently been high, with 50% in 2019, 71.4% in 2021, and 83.3% in 2022. For Fundamental of hydropower plant operations, we can see that the percentage scores for both male and female candidates have consistently been high, with 100% in all three years. For Install and protect electrical circuits, we can see that the percentage scores for female candidates have fluctuated from 66.7% in 2019 to 50% in 2021 and 100% in 2022. For male candidates, the percentage scores have consistently been high, with 83.3% in 2019, 85.7% in 2021, and 83.3% in 2022. For Pneumatic and hydraulic systems, we can see that there were no female candidates in 2019, but in 2021 and 2022, the percentage scores for female candidates were 100%. For male candidates, the percentage scores have increased from 33.3% in 2019 to 64.3% in 2021 and 100% in 2022.

For Technical and electrical drawing, we can see that the percentage scores for female candidates have fluctuated from 66.7% in 2019 to 100% in 2021 and 2022. For male candidates, the percentage scores have consistently been high, with 91.7% in 2019, 92.9% in 2021, and 100% in 2022. For Practical HPE, we can see that the percentage scores for both male and female candidates have consistently been high, with 100% in all three years. Overall, we can see that the percentage scores for male candidates have consistently been high, while the percentage scores for female candidates have fluctuated, but have generally improved over time.

Table 128: Average score, SD & VC scores in HPE

HPE		Pass (2019)	Pass (2021)	Pass (2022)
Fundamental of hydropower plant operations	Mean	74.9	56.1	65.6
	SD	16.4	17.9	16.8
	VC	21.8	31.8	25.7
Electricity and electrical measurements	Mean	39.7	72.7	57.1
	SD	23.3	22.0	26.0
	VC	58.7	45.4	45.5
Electrical static machines winding and rewinding	Mean	56.9	40.1	54.3
	SD	20.7	15.3	19.9
	VC	36.3	38.3	36.7
Electrical Generators and Motors operations	Mean	48.7	52.1	73.0
	SD	13.2	15.5	28.4
	VC	27.2	29.8	38.8
Install and protect electrical circuits	Mean	60.8	54.6	63.3
	SD	16.6	16.8	25.9
	VC	27.4	30.7	41.0
Pneumatic and Hydraulic systems	Mean	28.4	29.0	64.7
	SD	15.9	20.6	20.5
	VC	55.8	71.0	31.7
Technical and Electrical drawing	Mean	57.9	72.7	63.6
	SD	20.7	14.1	18.7
	VC	35.8	19.4	29.4
Practical HPE	Mean	91.1	96.1	87.7
	SD	3.3	2.1	5.5
	VC	3.6	2.2	6.3

For the Fundamental of Hydropower Plant Operations, the mean score was highest in 2019 at 74.9, but decreased to 56.1 in 2021 before increasing slightly to 65.6 in 2022. The SD and CV values were relatively consistent across the years. For Electricity and Electrical Measurements, the mean score was lowest in 2019 at 39.7, but increased significantly to 72.7 in 2021 before decreasing to 57.1 in 2022. The SD and CV values varied considerably across the years, with the highest variability seen in 2019. For Electrical Static Machines Winding and Rewinding, the mean score decreased from 56.9 in 2019 to 40.1 in 2021, but then increased to 54.3 in 2022.

The SD and CV values were consistent across the years. For Electrical Generators and Motors Operations, the mean score increased from 48.7 in 2019 to 52.1 in 2021 before significantly increasing to 73.0 in 2022. The SD and CV values increased considerably from 2019 to 2022. For Install and Protect Electrical Circuits, the mean score was highest in 2019 at 60.8, but decreased to 54.6 in 2021 before increasing slightly to 63.3 in 2022. The SD and CV values increased considerably from 2019 to 2022. For Pneumatic and Hydraulic Systems, the mean score was lowest in 2019 at 28.4, but increased slightly to 29.0 in 2021 before significantly increasing to 64.7 in 2022. The SD and CV values varied considerably across the years, with the highest variability seen in 2021. For Technical and Electrical Drawing, the mean score increased from 57.9 in 2019 to 72.7 in 2021 before decreasing slightly to 63.6 in 2022. The SD and CV values were highest in 2019, but decreased considerably in 2021 before increasing slightly in 2022. Finally, for the Practical HPE component, the mean score was consistently high across all three years, with little variation in the SD and CV values. Overall, we can see that the performance of the students varied considerably across the different subject and years, with some subject showing significant improvement over time (such as Electrical Generators and Motors Operations), while others showed more variability (such as Pneumatic and Hydraulic Systems).

Table 129: Pass rate in HPE by school ownership

HPE		2019		2021		2022	
		No.	%	No.	%	No.	%
Electrical generator and motors operations	PR	11	73.3	13	81.3	6	85.7
Electrical static machines winding and rewinding	PR	11	73.3	10	62.5	7	100.0
Electricity and electrical measurements	PR	7	46.7	11	68.8	6	85.7
Fundamental of hydropower plant operations	PR	15	100.0	13	81.3	7	100.0
Install and protect electrical circuits	PR	12	80.0	13	81.3	6	85.7
Pneumatic and hydraulic systems	PR	4	26.7	11	68.8	7	100.0
Technical and electrical drawing	PR	13	86.7	15	93.8	7	100.0
Practical HPE	PR	15	100.0	16	100.0	7	100.0

Table 129 shows the frequency and percentage of students who passed the HPE (Hydropower Energy) exams for different subjects in the years 2019, 2021, and 2022. Overall, the pass rates have been consistently high, with most subjects having a pass rate of over 80% in all three years. “Fundamental of hydropower plant operations” and “Practical HPE” had a pass rate of 100% in all three years. “Electrical generator and motors operations” and “Electrical static machines winding and rewinding” had a slightly lower pass rate in 2021 compared to 2019, but the pass rate increased in 2022 for both subjects. Electricity and electrical measurements subject had a pass rate of 46.7% in 2019, which increased to 68.8% in 2021 and further increased to 85.7% in 2022. “Pneumatic and hydraulic systems” had a low pass rate of 26.7% in 2019, but the pass rate increased significantly to 68.8% in 2021 and further increased to 100% in 2022. “Technical and electrical drawing” had a consistently high pass rate of over 85% in all three years. Overall, the data suggests that the students have performed well in the HPE exams, with consistent high pass rates in most subjects.

3.5.17 Industrial Electricity (IEL) Trade

Table 130 indicates the total number of students who sat for the National Exams in the trade of Industrial Electricity (IEL) for three years (2019, 2021 and 2022)

Table 130: Number of students who sat for the trade Industrial Electricity (IEL) Trade

Subjects	2019	2021	2022
Electrical drawing	1013	1189	1106
Electrical machines operations	1013	1189	1106
Electrical power transmission and distribution	1013	1189	1106
Electricity, electronics, and electrical measurements	1013	1189	1106
Pico-hydropower plant	1013	1189	1106
Pneumatic and hydraulic system	1013	1189	1106
Practical IEL	1013	1188	1106

As indicated in the table above, across the three years, the number of students who sat the exam for each subject remained relatively constant, with minor fluctuations. The highest number of students who sat for the exam for each subject was 1,189 in 2021, while the lowest number of students were 1,013 in 2019.

This table indicates that the enrollment in the IEL trade is consistent across the three years and across all subjects, suggesting that the combination trade have a stable and consistent demand from students. Overall, the table suggests that while the total number of students who sat for the IEL program increased in 2021, it also decreased in 2022. However, the number of students who attended each subject remained relatively constant over the three years.

Table 131: Pass rate trend in IEL in the Core subjects

IEL	2019		2021		2022	
Electrical machines operations	801	79.1	997	83.9	1,096	99.3
Electrical drawing	662	65.4	1019	85.7	1,096	99.3
Pico-hydropower plant	493	48.7	1002	84.3	1,088	98.6
Electrical power transmission and distribution	742	73.2	1024	86.1	1,084	98.2
Pneumatic and hydraulic system	291	28.7	993	83.5	1,072	97.2
Electricity, electronics and electrical measurements	610	60.2	895	75.3	1,072	97.1
Practical IEL	1006	99.3	1182	99.4	1,102	99.6

Table 131 shows the results of different subjects or trades for IEL (Industrial Electricity) in the three different academic years: 2019, 2021, and 2022. The table includes the trade name and the percentage of students who passed the trade in each academic year. Overall, it appears that the percentage of students passing each trade has increased over the years. The trade with the highest pass rate in all the three years was “Practical IEL,” with almost all students passing. The trade with the lowest pass rate in all three years is “Pneumatic and hydraulic system,” with less than 30% of students passing in 2019, but its pass rate has improved significantly to over 97% in 2022. Electrical machines operations had the pass rate of 79.1% in 2021 but increased significantly to 99.3% in 2022, making it the second-highest pass rate trade in 2022. Similarly, Electrical drawing had a pass rate of 65.4% in 2019 but increased to 85.7% in 2021 and further increased to 99.3% in 2022.

The Electricity, electronics, and electrical measurements trade had the pass rate of 60.2% in 2019 but increased to 75.3% in 2021 and further increased to 97.1% in 2022. The trade “Pico-hydropower plant” had a pass rate of 48.7% in 2019 but increased to 84.3% in 2021 and further increased to 98.6% in 2022. In general, the pass rate for each trade has increased significantly from 2019 to 2022, indicating an improvement in the quality of education or the teaching methods used by the schools.

Table 132: Pass rate in IEL Trade by Gender

IEL		2019		2021		2022	
		No.	%	No.	%	No.	%
Electrical drawing	Female	149	60.3	229	84.5	233	100.0
	Male	513	67.0	787	86.9	863	99.1
Electrical machines operations	Female	194	78.5	231	85.2	231	99.1
	Male	607	79.2	753	83.1	865	99.3
Electrical power transmission and distribution	Female	159	64.4	231	85.2	231	99.1
	Male	451	58.9	785	86.6	853	97.9
Electricity, electronics and electrical measurements	Female	159	64.4	214	79.0	232	99.6
	Male	451	58.9	673	74.3	840	96.4
Pico-hydropower plant	Female	89	36.0	209	77.1	230	98.7
	Male	404	52.7	787	86.9	858	98.5
Pneumatic and hydraulic system	Female	72	29.1	215	79.3	230	98.7
	Male	219	28.6	768	84.8	842	96.8
Practical IEL	Female	247	100.0	269	99.3	233	99.6
	Male	759	99.1	901	99.6	869	99.7

Based on the data given in the table 132, there are some notable differences in the pass rates between male and female students in some of the IEL subjects. Here are some observations: Electrical Drawing: In 2019, male students had a slightly higher pass rate than female students (67.0% vs 60.3%). However, in 2021 and 2022, the pass rate for female students increased significantly to 84.5% and 100%, respectively, while the pass rate for male students also increased, but not as much as 86.9% and 99.1%, respectively. It is interesting to note that in the last academic year, the pass rate for female students was higher than for male students.

In Electrical Machines Operations: In all the three academic years, the pass rates for male and female students were relatively similar, with female students having slightly higher pass rates than male students in 2022. Electrical Power Transmission and Distribution: In 2019, male students had a higher pass rate than female students (58.9% vs 64.4%). However, in 2021 and 2022, the pass rate for female students increased significantly to 85.2% and 99.1%, respectively, while the pass rate for male students also increased, but not as much as 86.6% and 97.9%, respectively. Again, it is interesting to note that in the last academic year of 2022, the pass rate for female students was higher than for male students.

Electricity, Electronics, and Electrical Measurements: In all the three academic years, male students had a lower pass rate than female students, with the gap widening in 2021 and 2022.

Pico-Hydropower Plant: In all the three academic years, male students had a higher pass rate than female students, although the gap decreased in 2022.

Pneumatic and Hydraulic System: In all three academic years, male students had a higher pass rate than female students, although the gap decreased in 2022.

Practical IEL: In all the three academic years, the pass rate for female students was 100%, while the pass rate for male students was very high, but not as quite as 100%. In summary, there are some gender-based differences in pass rates in some of the IEL subjects, with some subjects showing higher pass rates for female students and others showing higher pass rates for male students. It is worth noting that overall, both male and female students had high pass rates in all subjects.

Table 133: Average score, SD &VC for scores in IEL trade

IEL		2019	2021	2022
Pico-Hydropower Plant	Mean	38.5	58.0	59.1
	SD	11.8	16.5	17.4
	VC	30.6	28.4	29.4
Electrical drawing	Mean	46.5	67.0	69.7
	SD	15.4	15.3	16.4
	VC	33.1	22.8	23.6
Electricity, Electronics and Electrical measurements	Mean	43.5	43.8	56.7
	SD	18.5	21.9	18.1
	VC	42.4	50.0	31.8
Electrical power transmission and distribution	Mean	51.9	61.9	62.6
	SD	19.7	18.4	17.9
	VC	38.0	29.7	28.6
Electrical machines operations	Mean	52.9	68.7	70.4
	SD	16.2	17.6	16.6
	VC	30.5	25.6	23.6
Pneumatic and Hydraulic system	Mean	32.0	55.4	62.2
	SD	14.4	14.8	20.6
	VC	45.1	26.7	33.1
Practical IEL	Mean	93.9	93.1	93.3
	SD	5.0	5.0	5.0
	VC	5.3	5.4	5.3

Table 133 above shows the mean, standard deviation, and coefficient of variation (CV) of the pass rates for various subjects in IEL (Institute of Engineering and Technology) over the three consecutive academic years, 2019, 2021, and 2022.

Based on the data provided, the following observations can be made: In general, the mean score for all the subjects have increased over the years. The standard deviation (SD) and coefficient of variation (CV) have also increased for most of the subjects, indicating greater variability in the pass rates across students.

The practical IEL subject consistently has the highest pass rate, with a mean score of over 93 across all three years. It also has the lowest SD and CV, indicating high consistency in student performance in this subject. The Pneumatic and Hydraulic System subject had the lowest mean score of 32 in 2019, but it has shown a significant improvement in subsequent years, with a mean score of 62.2 in 2022. The Electrical Drawing subject has consistently shown the highest mean score, with a mean of 69.7 in 2022.

The Electrical Power Transmission and Distribution and Electrical Machines Operations subjects have shown a steady improvement in mean score over the years, with a mean score of over 60 in 2022. The Electricity, Electronics, and Electrical Measurements subject had a higher SD and CV compared to other subjects, indicating greater variability in student performance in this subject across the three years. Overall, the data shows that there has been an improvement in the performance for most subjects in IEL over the years. However, the variability in the student performance has also increased, indicating the need for more personalized and focused approaches to teaching and learning.

Table 134: Pass rate in IEL trade by school ownership

IEL		2019		2021		2022	
		No.	%	No.	%	No.	%
Electrical drawing	GA	143	79.0	308	90.6	220	100.0
	PR	223	53.1	306	75.2	389	99.7
	PU	295	73.0	397	94.7	471	99.8
Electrical machines operations	GA	165	91.2	312	91.8	220	100.0
	PR	283	67.4	290	71.3	385	98.7
	PU	352	87.1	380	90.7	471	99.8
Electrical power transmission and distribution	GA	164	90.6	332	97.6	220	100.0
	PR	251	59.8	295	72.5	378	96.9
	PU	327	80.9	386	92.1	471	99.8
Electricity, electronics and electrical measurements	GA	135	74.6	305	89.7	219	99.6
	PR	209	49.8	239	58.7	369	94.6
	PU	266	65.8	341	81.4	469	99.4

Pico-hydropower plant	GA	110	60.8	319	93.8	220	100.0
	PR	165	39.3	288	70.8	381	97.7
	PU	218	54.0	385	91.9	471	99.8
Pneumatic and hydraulic system	GA	78	43.1	313	92.1	218	99.1
	PR	97	23.1	287	70.5	369	94.6
	PU	116	28.7	380	90.7	470	99.6
Practical IEL	GA	181	100.0	339	99.7	220	100.0
	PR	417	99.3	405	99.5	388	99.0
	PU	402	99.5	417	99.8	472	100.0

Table 134 shows the frequency and percentage of students who passed IEL (Industrial Electricity) in various subjects and academic years, categorized by ownership (GA – Government-Aided, PR – Private, PU – Public). Overall, the pass rates have improved significantly from 2019 to 2022 for most subjects and ownership categories. In fact, for some subjects and ownership categories (e.g., Pico-hydropower plant and Practical IEL for GA), the pass rates were at 100% in the most recent academic year. In terms of ownership, there seems to be a trend where government-aided schools (GA) have higher pass rates compared to private (PR) and public (PU) schools. This trend is consistent across all subjects and academic years. For instance, in Electrical drawing, GA had a pass rate of 79.0% in 2019, which increased to 100% in 2022, while PR had a pass rate of 53.1% in 2019, which increased to 99.7% in 2022, and PU had a pass rate of 73.0% in 2019, which increased to 99.8% in 2022.

In conclusion, the pass rates for IEL exams have generally improved over time, with government-aided schools showing higher pass rates compared to private and public schools. Further research can be conducted to establish the above facts in performance based on the type of ownership.

3.5.18 Interior Design (IND) Trade

Table 135 shows the number of students who sat for the National Exams for Interior Design (IND) across the three academic years, namely 2019, 2021, and 2022. There were eight subjects related to interior design.

Table 135: Number of students who sat for the trade of Interior Design (IND)

Subjects	2019	2021	2022
Designing and implementing furniture	15	68	47
Designing and performing ceiling	15	68	47
Designing and performing doors and windows	15	68	47
Designing and performing floors	15	68	47
Designing and performing wall finishing	15	68	47
Performing painting coats	15	68	47
Practical IND	15	68	47
Soft furnishing and interior branding design	15	68	47

In the table above, statistics show that in 2019, the number of students who sat for the IND National Exams was 15 for the eight subjects listed in the table. However, in the academic year 2021, there was a significant increase in the number of students who sat for the exams from 15 to 68 students across all the eight subjects. This represents a 353.3% increase in the number of students who sat for the IND National Exams compared to the previous year. In the academic year 2022, there was a slight decrease in the number of students who sat for the exams across all the eight subjects with 47 students in each subject. Overall, the table suggests that there has been a significant increase in the popularity of Interior Design as a profession, with more students opting to pursue this career path. However, it is unclear whether this increase in popularity is due to a growing demand for interior design services or a shift in career preferences among students. Thus, there is need for research to establish the factors that have caused an increase in the interest of studying Interior design.

Table 136: Number of students who sat for the trade of Interior Design (IND)

IND	2019		2021		2022	
	No.	%	No.	%	No.	%
Designing and implementing furniture	15	100.0	65	95.6	47	100.0
Designing and performing wall finishing	15	100.0	68	100.0	47	100.0
Performing painting coats	15	100.0	57	83.8	47	100.0
Designing and performing floors	15	100.0	68	100.0	47	100.0
Soft furnishing and interior branding design	15	100.0	64	94.1	47	100.0
Designing and performing doors and windows	15	100.0	67	98.5	47	100.0
Designing and performing ceiling	15	100.0	57	83.8	47	100.0
Practical IND	15	100.0	68	100.0	47	100.0

Table 136 shows the frequency and percentage of students who passed in different subjects of Interior design trade (IND) for the years 2019, 2021, and 2022. The analyzed subjects include designing and implementing furniture, wall finishing, painting coats, floors, soft furnishing and interior branding design, doors and windows, ceiling design, and practical IND. From the table above, it can be observed that for all the subjects listed, the pass rate was 100% in the academic year 2019. However, in the academic year 2021, some subjects had a slightly lower pass rate, with the lowest being 83.8% for performing painting coats. In the most recent academic year, 2022, all subjects had a 100% pass rate again.

Table 137: Pass rate in IND trade by Gender

IND		2019		2021		2022	
		No.	%	No.	%	No.	%
Designing and implementing furniture	Female	15	100.0	54	96.4	35	100
	Male	NA	NA	11	91.7	12	100
Designing and performing ceiling	Female	15	100.0	49	87.5	35	100
	Male	NA	NA	8	66.7	12	100
Designing and performing doors and windows	Female	15	100.0	55	98.2	35	100
	Male	NA	NA	12	100.0	12	100
Designing and performing floors	Female	15	100.0	56	100.0	35	100
	Male	NA	NA	12	100.0	12	100
Designing and performing wall finishing	Female	15	100.0	56	100.0	35	100
	Male	NA	NA	12	100.0	12	100
Performing painting coats	Female	15	100.0	46	82.1	35	100
	Male	NA	NA	11	91.7	12	100
Soft furnishing and interior branding design	Female	15	100.0	52	92.9	35	100
	Male	NA	NA	12	100.0	12	100
Practical IND	Female	15	100.0	56	100.0	35	100
	Male	NA	NA	12	100.0	12	100

Table 137 above shows the frequency and percentage of students who passed Industrial Design (IND) for the different subjects in 2019, 2021, and 2022. The data is split by gender, and there are no records for male performance in 2019. Overall, the table shows that female candidates consistently performed well in IND trade, with a pass rate of 100% for all subjects in all three years. Male candidates also had high pass rates, with a few exceptions in specific tasks and years. In 2021, male candidates had a slightly lower pass rate than females in designing and performing ceilings, painting coats, and soft furnishing and interior branding design. However, in 2022, male candidates had a perfect pass rate for all subjects, similar to female candidates. In summary, the data suggests that both male and female candidates performed well in the IND exams, but female candidates consistently had a 100% pass rate across all the subjects and years.

Table 138: Average score, SD & Variation Coefficient in IND trade

IND		Pass (2019)	Pass (2021)	Pass (2022)
Designing and performing doors and windows	Mean	76.3	80.7	64.5
	SD	8.4	12.9	13.6
	VC	11.0	16.0	21.1
Designing and performing floors	Mean	88.2	81.0	89.0
	SD	6.5	7.4	11.3
	VC	7.4	9.2	12.8
Designing and performing wall finishing	Mean	88.4	80.0	82.7
	SD	4.2	9.6	8.9
	VC	4.8	12.0	10.7
Performing painting coats	Mean	75.5	65.3	81.7
	SD	8.0	15.5	14.4
	VC	10.5	23.7	17.6
Designing and performing ceiling	Mean	83.7	68.6	91.3
	SD	8.1	17.9	8.9
	VC	9.7	26.1	9.7
Soft furnishing and interior branding design	Mean	84.3	83.4	79.9
	SD	7.8	12.8	14.5
	VC	9.3	15.4	18.2
Designing and implementing furniture	Mean	79.7	81.9	82.8
	SD	9.8	12.8	9.2
	VC	12.3	15.6	11.2
Practical IND	Mean	94.8	96.6	93.2
	SD	2.3	2.2	3.5
	VC	2.4	2.3	3.8

Table 139 above shows the mean score, standard deviation, and coefficient of variation (CV) for different subjects in Interior design (IND) trade. The values are presented for the three years: 2019, 2021, and 2022. For the subject of designing and performing doors and windows, the mean score increased from 76.3 in 2019 to 80.7 in 2021 and then decreasing to 64.5 in 2022. The standard deviation and CV increased over the years, indicating more variability in the scores among the students. For designing and performing floors, the mean score increased from 88.2 in 2019 to 89.0 in 2022, with a slight incline in 2021. The standard deviation and CV

also showed some fluctuation, but overall remained relatively stable. For designing and performing wall finishing, the mean score decreased from 88.4 in 2019 to 82.7 in 2022. The standard deviation and CV increased over the years, indicating more variability in the scores among the students. For performing painting coats, the mean score increased from 75.5 in 2019 to 81.7 in 2022, with a incline in 2021. The standard deviation and CV increased over the years, indicating more variability in the scores among the students. For designing and performing ceilings, the mean score increased from 83.7 in 2019 to 91.3 in 2022, with a decline in 2021. The standard deviation and CV showed some fluctuation but remained relatively stable over the years. For soft furnishing and interior branding design, the mean score remained relatively stable over the years, with a slight decrease from 84.3 in 2019 to 79.9 in 2022. The standard deviation and CV increased over the years, indicating more variability in the scores among the students. For designing and implementing furniture, the mean score remained relatively stable over the years, with a slight increase from 79.7 in 2019 to 82.8 in 2022. The standard deviation and CV showed some fluctuation but remained relatively stable over the years. For practical IND, the mean score remained high and relatively stable over the years, with a slight decrease from 94.8 in 2019 to 93.2 in 2022. The standard deviation and CV increased over the years but remained low, indicating low variability in the scores among the students. In summary, the table shows some variability in the performance of students across different subjects in the field of designing and performing interior design. Some subjects showed a decrease in mean scores over the years, while others remained relatively stable. The standard deviation and CV increased over the years for most subjects, indicating more variability in the scores among the students.

Table 139: Pass rate in Interior Design trade by school ownership

IND		Pass (2019)		Pass (2021)		Pass (2022)	
		Freq	%	Freq	%	Freq	%
Designing and implementing furniture	GA	NA	NA	30	100.0	18.0	100.0
	PU	15	100.0	35	92.1	29.0	100.0
Designing and performing ceiling	GA	NA	NA	30	100.0	18.0	100.0
	PU	15	100.0	27	71.1	29.0	100.0
Designing and performing doors and windows	GA	NA	NA	30	100.0	18.0	100.0
	PU	15	100.0	37	97.4	29.0	100.0
Designing and performing floors	GA	NA	NA	30	100.0	18.0	100.0
	PU	15	100.0	38	100.0	29.0	100.0
Designing and performing wall finishing	GA	NA	NA	30	100.0	18.0	100.0
	PU	15	100.0	38	100.0	29.0	100.0

Performing painting coats	GA	NA	NA	30	100.0	18.0	100.0
	PU	15	100.0	27	71.1	29.0	100.0
Soft furnishing and interior branding design	GA	NA	NA	30	100.0	18.0	100.0
	PU	15	100.0	34	89.5	29.0	100.0
Practical IND	GA	N A	N A	30	100.0	18.0	100.0
	PU	15	100.0	38	100.0	29.0	100.0

Table 142 indicates the pass rate by subject for Interior design trade (IND) over the year and school ownership. The analyzed subjects include designing and implementing furniture, Designing and performing ceiling, Designing and performing doors and windows, Designing and performing floors, Designing and performing wall finishing, Performing painting coats, soft furnishing and interior branding design, and practical IND. It should be noted that the table above indicates that there is no data for government aided schools (GA) in 2019. Based on the data provided in the table above the government-aided schools (GA) have been performing exceptionally well in 2021 and 2022, with a 100% pass rate in all subjects. While in Public schools (PU) the data provided in the table above indicates fluctuation in pass rate for some subjects such as Designing and implementing furniture, Performing painting coats and soft furnishing and interior branding design. In Designing and implementing furniture: The pass rate increased from 100% in 2019 to 92.1% in 2021 but then improved to 100% in 2022.

For Performing painting coats: The pass rate decreased from 100% in 2019 to 71.1% in 2021 but then improved to 100% in 2022 and in Soft furnishing and interior branding design, the pass rate decreased from 100% in 2019 to 89.5% in 2021 but then improved to 100% in 2022. In Designing and performing ceiling, Designing and performing doors and windows, Designing and performing floors, Designing and performing wall finishing and Practical IND, the pass rate was 100% in all the three years. Overall, the pass rates were consistently high in all subjects except for Performing painting coats and Soft furnishing and interior branding design in 2021, which saw a temporary decline before improving in 2022. The pass rate for Practical IND was also consistently high across all years.

3.5.19 Land Surveying (LSV) Trade

This section provides data on the pass rate and performance of students in LSV by gender and by type of school ownership. It presents the total number of students who sat for the Land Surveying (LSV) National Exams for various subjects in 2019, 2021 and 2022.

Table 140: Number of students who sat for LSV

Subjects	2019	2021	2022
Arc GIS software in land management and mapping	111	113	90
Fundamental surveying computations	111	113	90
Operating surveying instruments	111	113	90
Performing cadastral measurement	111	113	90
Performing setting out of structures	111	113	90
Practical LSV	111	113	90
Road alignment and setting out	111	113	90
Surveying measurement adjustment	111	113	90

It can also be observed that there were 111 students who sat for all the eight subjects in the LSV trade in the year 2019. In the next academic year, 2021, the number of students was 113, and in 2022 it reduced to 90 in 2022.

However, it is interesting to note that the number of students who sat for the national exams for each subject decreased from 113 to 90 in 2021 and 2022. Overall, the table provides insights into the number of students who sat for the LSV National Exams for various subjects over the three-year period and highlights the trend of decreasing numbers of students who sat for these exams for each individual subject.

Table 141: Pass rate trend in LSV Core subjects

LSV	2019		2021		2022	
	No.	%	No.	%	No.	%
Arc GIS software in land management and mapping	82	73.9	96	85.0	88	97.8
Performing cadastral measurement	108	97.3	99	87.6	90	100.0
Performing setting out of structures	106	95.5	111	98.2	90	100.0
Surveying measurement adjustment	76	68.5	102	90.3	90	100.0
Operating surveying instruments	94	84.7	89	78.8	89	98.9
Road alignment and setting out	86	77.5	101	89.4	90	100.0
Fundamental surveying computations	86	77.5	99	87.6	89	98.9
Practical LSV	111	100.0	113	100.0	90	100.0

Table 141 shows the percentage score of different subjects in Land Surveying (LSV) across three academic years: 2019, 2021, and 2022. For the subject “Arc GIS software in land management and mapping,” the percentage score increased from 73.9% in 2019 to 85.0% in 2021, and then further increased to 97.8% in 2022. For “Performing cadastral measurement,” the percentage score increased from 77.5% in 2019 to 100% in 2021, and 100% in 2022. Similarly, for “Performing setting out of structures” and “Road alignment and setting out,” the percentage score was consistently high, with a score of 95.5% and 77.5%, respectively, in 2019, and a perfect score of 100% in 2021 and 2022.

For “Surveying measurement adjustment,” the percentage score increased from 68.5% in 2019 to 90.3% in 2021 and remained constant at 100% in 2022. For “Operating surveying instruments,” the percentage score remained high, with a score of 84.7% in 2019, 78.8% in 2021, and 98.9% in 2022. For “Fundamental surveying computations,” the percentage score was consistently high, with a score of 77.5% in 2019 and 87.6% in 2021 and a score of 98.9% in 2022. For “Practical LSV,” the percentage score was a perfect 100% in all three academic years. Overall, the percentage scores of most subjects remained consistently high over the three academic years, with some showing improvement, while others remained constant.

Table 142: Pass rate in LSV by Gender

LSV		Pass (2019)		Pass (2021)		Pass (2022)	
		Freq	%	Freq	%	Freq	%
Arc GIS software in land management and mapping	Female	34	73.9	42	82.4	39	97.5
	Male	48	73.8	54	87.1	49	98.0
Fundamental surveying computations	Female	34	73.9	45	88.2	39	97.5
	Male	52	80.0	54	87.1	50	100.0
Operating surveying instruments	Female	39	84.8	41	80.4	40	100.0
	Male	55	84.6	48	77.4	50	100.0
Performing cadastral measurement	Female	46	100.0	46	90.2	40	100.0
	Male	62	95.4	53	85.5	50	100.0
Performing setting out of structures	Female	44	95.7	51	100.0	40	100.0
	Male	62	95.4	60	96.8	50	100.0
Road alignment and setting out	Female	37	80.4	47	92.2	40	100.0
	Male	49	75.4	54	87.1	50	100.0
Surveying measurement adjustment	Female	40	87.0	46	90.2	40	100.0
	Male	36	55.4	56	90.3	50	100.0
Practical LSV	Female	46	100.0	51	100.0	40	100.0
	Male	65	100.0	62	100.0	50	100.0

Table 142 indicates the performance of male and female students in different subjects of LSV (Land Surveying) over three academic years: 2019, 2021, and 2022. In the subject of "Arc GIS software in land management and mapping," both male and female students showed improvement in their performance over the three years. However, female students had a consistently higher pass rate compared to male 2021/2022 respectively while male students had a pass rate of 73.8%, 87.1%, and 98.0%. In the subject of "Fundamental surveying computations," female students also showed improvement in their pass rate, with a pass rate of 73.9%, 88.2%, and 97.5% over the three years, 2019, 2021 and 2022 respectively. Male students had a higher pass rate than female students in 2019, with a pass rate of 80.0%, but their pass rate decreased slightly in 2021 and remained the same in 2022, with a pass rate of 87.1% and 100.0%, respectively.

In the subject of "Operating surveying instruments," both male and female students had a consistently high pass rate of over 80% in all three years, with female students having a slightly higher pass rate than male students in 2019 and 2022. In the subject of "Performing cadastral measurement," female students had a perfect pass rate of 100% in all three years, while male students had a slightly lower pass rate than female students, with a pass rate of 95.4%, 85.5%, and 100.0% over the three years, 2019, 2021 and 2022 respectively. In the subject of "Performing setting out of structures," both male and female students had a consistently high pass rate of 95.4% and above in all three years, with female students having a perfect pass rate of 100% in 2021. In the subject of "Road alignment and setting out," both male and female students showed improvement in their pass rate over the three years, with female students having a higher pass rate than male students in all three years.

In the subject of "Surveying measurement adjustment," female students had a consistently high pass rate of 87.0% and above in all three years, while male students had a lower pass rate of 55.4% in 2019 but showed improvement in 2021 with the pass rate of 90.3% and 2022 with the pass rate of 100%. In the subject of "Practical LSV," both male and female students had a perfect pass rate of 100% in all three years. Overall, female students had a consistently high pass rate in all subjects over the three years, with a perfect pass rate in two subjects. Male students had a lower pass rate in some subjects, but they also showed improvement in their performance over the years.

Table 143: Average score, SD & VC in LSV trade

LSV		Pass (2019)	Pass (2021)	Pass (2022)
Road Alignment and Setting out	Mean	51.5	76.4	66.9
	SD	12.6	12.6	19.0
	VC	24.5	16.5	28.3
Arc GIS software in land management and mapping	Mean	49.4	72.8	70.6
	SD	15.2	16.1	18.5
	VC	30.8	22.1	26.2
Fundamental Surveying Computations"	Mean	53.2	70.3	69.0
	SD	19.1	14.9	13.5
	VC	35.9	21.2	19.5
Operating Surveying Instruments	Mean	53.9	68.1	64.0
	SD	14.7	14.9	14.8
	VC	27.3	21.9	23.2
Performing Setting out of Structures	Mean	60.8	86.2	62.7
	SD	12.6	9.3	14.0
	VC	20.7	10.7	22.3
Surveying Measurement Adjustment	Mean	50.0	81.7	73.7
	SD	18.2	15.1	13.3
	VC	36.3	18.5	18.0
Performing Cadastral Measurement	Mean	69.6	75.8	75.9
	SD	13.4	13.7	16.7
	VC	19.2	18.1	22.1
Practical LSV	Mean	96.2	96.5	93.8
	SD	5.2	3.2	3.6
	VC	5.4	3.3	3.8

Table 143 indicates the performance of students in different subjects over the years using the mean score, standard deviation, and coefficient of variation (CV).

The mean score represents the average performance of students in a particular subject, while the standard deviation shows the spread of the data around the mean. The coefficient of variation (CV) is a measure of relative variability that is useful for comparing the spread of data across different subjects, as it expresses the standard deviation as a percentage of the mean.

From the data in the table above, we can observe the following: In Road Alignment and Setting out, the mean score improved from 51.5 in 2019 to 76.4 in 2021 and then decreased to 66.9 in 2022. The standard deviation increased from 12.6 in 2019 to 19.0 in 2022, indicating increased variability in the performance of students. The coefficient of variation also increased from 24.5% in 2019 to 28.3% in 2022, indicating increased relative variability.

In Arc GIS software in land management and mapping, the mean score increased from 49.4 in 2019 to 72.8 in 2021 and then slightly increased again to 70.6 in 2022. The standard deviation and coefficient of variation also increased from 15.2% and 30.8% in 2019 to 18.5% and 26.2% in 2022, respectively. In Fundamental Surveying Computations, the mean score decreased from 53.2 in 2019 to 70.3 in 2021 and then remained relatively stable at 69.0 in 2022. The standard deviation and coefficient of variation decreased from 19.1% and 35.9% in 2019 to 13.5% and 19.5% in 2022, respectively.

In Operating Surveying Instruments, the mean score decreased from 53.9 in 2019 to 68.1 in 2021 and then decreased again to 64.0 in 2022. The standard deviation and coefficient of variation remained relatively stable over the years. In Performing Setting out of Structures, the mean score improved from 60.8 in 2019 to 86.2 in 2021 and then decreased to 62.7 in 2022. The standard deviation increased from 12.6 in 2019 to 14.0 in 2021 and then slightly decreased to 9.3 in 2022. The coefficient of variation also increased from 20.7% in 2019 to 22.3% in 2022. In Surveying Measurement Adjustment, the mean score increased from 50.0 in 2019 to 81.7 in 2021 and then increased again to 73.7 in 2022. The standard deviation and coefficient of variation decreased from 18.2% and 36.3% in 2019 to 13.3% and 18.0% in 2022, respectively. In Performing Cadastral Measurement, the mean score remained relatively stable over the years, with a slight increase from 69.6 in 2019 to 75.8 in 2021 and then a slight decrease to 75.9 in 2022.

In Performing Cadastral Measurement, the mean score has increased slightly from 69.6 to 75.9 in 2019 to in 2022 respectively. The standard deviation has increased from 13.4 in 2019 to 16.7 in 2022. The coefficient of variation (CV) has also increased from 19.2% in 2019 to 22.1% in 2022. This indicates that there is a greater variation in the scores among the students in 2022 compared to 2019. In Practical LSV, the mean score has remained relatively stable, with a slight dip from 96.5 in 2021 to 93.8 in 2022. The standard deviation has remained low, ranging from 3.2 to 5.2 over the years and the coefficient of variation (CV) has also remained low, ranging from 3.3% to 5.4% over the years. This indicates that there is relatively little variation in the scores among the students over the years. Overall, the students seem to have improved their performance in Performing Cadastral Measurement, but with a greater variation in the scores. On the other hand, the students' performance in Practical LSV has remained stable with low variability in scores.

Table 144: Pass rate of in Interior Design trade by school ownership

LSV		Pass (2019)		Pass (2021)		Pass (2022)	
Arc GIS software in land management and mapping	GA	32	100.0	25	78.1	33	97.1
	PR	11	39.3	20	76.9	4	100.0
	PU	39	76.5	51	92.7	51	98.1
Fundamental surveying computations	GA	31	96.9	31	96.9	34	100.0
	PR	12	42.9	16	61.5	4	100.0
	PU	43	84.3	52	94.5	51	98.1
Operating surveying instruments	GA	31	96.9	23	71.9	34	100.0
	PR	22	78.6	17	65.4	4	100.0
	PU	41	80.4	49	89.1	51	98.1
Performing cadastral measurement	GA	32	100.0	30	93.8	34	100.0
	PR	26	92.9	22	84.6	4	100.0
	PU	50	98.0	47	85.5	52	100.0
Performing setting out of structures	GA	32	100.0	30	93.8	34	100.0
	PR	26	92.9	26	100.0	4	100.0
	PU	48	94.1	55	100.0	52	100.0
Road alignment and setting out	GA	31	96.9	26	81.3	34	100.0
	PR	17	60.7	24	92.3	4	100.0
	PU	38	74.5	51	92.7	52	100.0
Surveying measurement adjustment	GA	28	87.5	29	90.6	34	100.0
	PR	23	82.1	26	100.0	4	100.0
	PU	25	49.0	47	85.5	52	100.0
Practical LSV	GA	32	100.0	32	100.0	34	100.0
	PR	28	100.0	26	100.0	4	100.0
	PU	51	100.0	55	100.0	52	100.0

Based on the data given in the table 144, the performance of students in the different subjects varied across the three school ownership categories (GA, PR, and PU) and over the years. In Arc GIS software in land management and mapping the pass rate in GA schools was 100% in 2019 and 2022, but dropped to 78.1% in 2021 and the pass rate in PR schools improved from 39.3% in 2019 to 76.9% in 2021, and then to 100% in 2022. The pass rate in PU schools was consistently high, ranging from 76.5% in 2019 to 98.1% in 2022.

In Fundamental surveying computations, the pass rate was consistently high, ranging from 96.9% to 100% over the years for GA schools. While it was improved from 42.9% in 2019 to 100% in 2022, with a slight dip to 61.5% in 2021 in PR schools. The pass rate was consistently high, ranging from 84.3% to 98.1% over the years in PU schools.

For Operating surveying instruments subject, the pass rate was consistently high, ranging from 71.9% to 100% over the years in GA schools and the pass rate in PR schools fluctuated, with a high of 78.6% in 2019 and a low of 65.4% in 2021 while the pass rate improved from 80.4% in 2019 to 98.1% in 2022 in PU schools. For Performing cadastral measurement subject in GA schools, the pass rate was consistently high, ranging from 93.8% to 100% over the years but for PR schools, the pass rate improved from 92.9% in 2019 to 100% in 2022, with a slight dip to 84.6% in 2021 while in PU schools the pass rate fluctuated, with a high of 98.0% in 2019 and a low of 85.5% in 2021. In Performing setting out of structures the pass rate in GA schools was consistently high, ranging from 93.8% to 100% over the years, in PR schools, the pass rate was consistently high, ranging from 92.9% to 100% over the years and the pass rate in PU schools was consistently high, ranging from 94.1% to 100% over the years. For the subject of "Road alignment and setting out," the GA school had a pass rate of 96.9% in 2019, which decreased to 81.3% in 2021 and further improved to 100% in 2022. The PR school had a pass rate of 60.7% in 2019, which improved to 92.3% in 2021 and reached 100% in 2022. The PU school had a pass rate of 74.5% in 2019, which increased to 92.7% in 2021 and maintained a 100% pass rate in 2022. For the subject of "Surveying measurement adjustment," the GA school had a pass rate of 87.5% in 2019, which improved to 90.6% in 2021 and further increased to 100% in 2022. The PR school had a pass rate of 82.1% in 2019, which improved to 100% in both 2021 and 2022. The PU school had a pass rate of 49.0% in 2019, which improved to 85.5% in 2021 and reached 100% in 2022.

For the subject of "Practical LSV," all the three types of school ownership (GA, PR, and PU) had a 100% pass rate in all the three years (2019, 2021, and 2022).

Overall, it appears that PU schools had the highest pass rates in most subjects, while PR schools had the lowest pass rates in some subjects.

3.5.20 Masonry (MAS) trade

Table 145 shows the total number of students who sat for the National Exams for the trade of Masonry (MAS) in 2019, 2021, and 2022. There were six subjects that were examinable.

Table 145: Number of students who sat for the trade Masonry (MAS) exams

Subjects	2019	2021	2022
Concrete technology	3704	3868	3195
Cost estimation, schedule and site records	3704	3868	3194
Elevation and scaffolding operations	3704	3868	3194
Masonry basic drawing	3704	3868	3195
Practical MAS	3704	3868	3196
Tiles works, openings and wall plastering	3704	3868	3194

Looking at the data in Table 145, it is clear that the total number of students who sat for all of the listed subjects in the trade of Masonry (MAS) decreased from 2019 to 2022. This trend is visible across all of the subjects listed in the table. For instance, in 2019, the total number of students who sat for each subject was 3,704. In 2021, the total number of students increased to 3,868 for all subjects. However, in 2022, there was a decrease in the total number of students who sat for each subject, with the lowest number being 3,194 for the subject of “Cost estimation, schedule and site records.” It is important to note that while the overall trend shows a decrease in the number of students choosing the listed subjects, some subjects had a slightly higher number of students attending in certain years. For example, “Practical MAS” had the highest number in 2022 with 3,196 students. Overall, the table suggests a decline in the number of students who sat for subjects in the trade of Masonry (MAS) over the past three years. However, it is worth noting that this trend may be influenced by a variety of factors, which needs to be researched.

Table 146: Pass rate trend in Masonry (MAS) Core subjects

MAS	2019		2021		2022	
	No.	%	No.	%	No.	%
Concrete technology	3425	92.5	3553	91.9	3160	98.9
Cost estimation, schedule and site records	2616	70.6	3368	87.1	3116	97.6
Elevation and scaffolding operations	3599	97.2	3590	92.8	3175	99.4
Masonry basic drawing	3496	94.4	3603	93.1	3155	98.8
Tiles works, openings and wall plastering	3629	98.0	3732	96.5	3167	99.2
Practical MAS	3686	99.5	3860	99.8	3180	99.5

Looking at the data provided in table 149, it can be observed that the pass rate for each of the subjects have generally remained consistent or improved over the years. Concrete technology has consistently had a high pass rate, with a slight dip in 2021 but still maintaining a pass rate of 91.9%. However, in 2022, the pass rate for concrete technology increased significantly to 98.9%. Cost estimation, schedule, and site records had a significant increase in pass rate from 70.6% in 2019 to 87.1% in 2021, and then maintained a high pass rate of 97.6% in 2022. Elevation and scaffolding operations had a slight decrease in pass rate from 97.2% in 2019 to 92.8% in 2021, but then increased significantly to 99.4% in 2022. Masonry basic drawing had a consistent pass rate, with a slight decrease from 94.4% in 2019 to 93.1% in 2021 but then increased to 98.8% in 2022. Tiles works, openings, and wall plastering had a consistently high pass rate, with a slight decrease from 98.0% in 2019 to 96.5% in 2021 but then increased to 99.2% in 2022. Practical MAS had a consistently high pass rate, with a slight increase from 99.5% in 2019 to 99.8% in 2021 but then decreased slightly to 99.5% in 2022. Overall, it appears that the students' performance has improved over the years for most subjects, with some subjects experiencing a significant increase in pass rate from the previous year.

Table 147: Pass rate in MAS Trade by Gender

MAS		2019		2021		2022	
		No.	%	No.	%	No.	%
Concrete technology	Female	558	91.9	563	88.7	485	98.2
	Male	2867	92.6	2975	92.5	2675	99.0
Cost estimation, schedule and site records	Female	426	70.2	555	87.4	479	97.0
	Male	2190	70.7	2799	87.0	2637	97.7
Elevation and scaffolding operations	Female	582	95.9	589	92.8	487	98.6
	Male	3017	97.4	2985	92.8	2688	99.6
Masonry basic drawing	Female	569	93.7	599	94.3	487	98.6
	Male	2927	94.5	2989	92.9	2668	98.8
Tiles works, openings and wall plastering	Female	589	97.0	615	96.9	487	98.6
	Male	3040	98.2	3099	96.4	2680	99.3
Practical MAS	Female	601	99.0	634	99.8	489	99.0
	Male	3085	99.6	3209	99.8	2691	99.6

Based on the data provided table 147, it appears that, overall, both male and female have performed well in the various subjects in the Masonry (MAS). However, there are some variations in the percentage of passes between the genders and across different years. For the subject of Concrete Technology, the percentage of females passing decreased from 91.9% in 2019 to 88.7% in 2021, but increased

again to 98.2% in 2022. Meanwhile, the percentage of males passing remained relatively consistent over the years, ranging from 92.5% to 99.0%.

In Cost estimation, schedule and site records, the percentage of female passes increased significantly from 70.2% in 2019 to 87.4% in 2021, and then slightly to 97.0% in 2022. The percentage of male passes also increased, but not as drastically, from 70.7% to 97.7% over the same years. For Elevation and scaffolding operations, the percentage of female passes decreased slightly from 95.9% in 2019 to 92.8% in 2021, but then increased again to 98.6% in 2022. The percentage of male passes also decreased slightly from 97.4% in 2019 to 92.8% in 2021, but then increased significantly to 99.6% in 2022. The percentage of female passes in Masonry basic drawing remained relatively consistent over the years, ranging from 93.7% to 98.6%, while the percentage of male passes decreased from 94.5% in 2019 to 92.9% in 2021, before increasing again to 98.8% in 2022.

In Tiles works, openings, and wall plastering, the percentage of female passes remained consistent at around 97%, while the percentage of male passes decreased slightly from 98.2% in 2019 to 96.4% in 2021, before increasing to 99.3% in 2022. Finally, for Practical MAS, both male and female passes remained consistently high over the years, ranging from 99.0% to 99.8%.

In general, the performance of both males and females in the different subjects of the masonry (MAS) program is relatively consistent, with some minor variations in pass rates between the genders and across different years.

Table 148: Average scores, SD& CV of score in MAS

MAS		Pass (2019)	Pass (2021)	Pass (2022)
Concrete technology	Mean	71.07	75.69	76.1
	SD	17.80	16.42	19.0
	VC	25.04	21.70	24.9
Cost estimation, schedule and site records	Mean	50.53	64.10	64.7
	SD	19.43	19.87	20.4
	VC	38.46	31.00	31.6
Elevation and Scaffolding operations	Mean	77.83	77.78	80.5
	SD	14.14	16.33	16.1
	VC	18.16	21.00	20.1
Masonry basic drawing	Mean	72.03	73.08	73.6
	SD	16.65	14.69	18.0
	VC	23.12	20.10	24.5

Tiles works, openings and wall plastering	Mean	81.39	80.43	72.8
	SD	13.19	13.90	17.9
	VC	16.21	17.28	24.6
Practical MAS	Mean	92.36	93.26	92.4
	SD	5.55	4.64	5.1
	VC	6.01	4.98	5.6

Table 148 provides information about the mean scores, standard deviation (SD), and coefficient of variation (VC) for five subjects in Masonry (MAS) trade for three consecutive years (2019, 2021, and 2022). For Concrete technology: The mean score for this subject has gradually increased over the years, from 71.07 in 2019 to 76.1 in 2022. The standard deviation has also increased slightly from 17.80 to 19.0, and the coefficient of variation has remained relatively stable, ranging from 25.04% to 24.9%.

For Cost estimation, schedule, and site records: The mean score for this subject has significantly increased from 50.53 in 2019 to 64.7 in 2022. The standard deviation and coefficient of variation have also increased, indicating that the performance of the students has become more varied over the years. For Elevation and scaffolding operations: The mean score for this subject has remained relatively stable over the years, ranging from 77.83 to 80.5. The standard deviation and coefficient of variation have also remained relatively stable, ranging from 14.14% to 16.1%.

For Masonry basic drawing: The mean score for this subject has remained stable over the years, ranging from 72.03 to 73.6. The standard deviation has increased slightly, from 16.65 in 2019 to 18.0 in 2022, and the coefficient of variation has also increased slightly, ranging from 23.12% to 24.5%. For Tiles works, openings, and wall plastering: The mean score for this subject has decreased significantly from 81.39 in 2019 to 72.8 in 2022. The standard deviation and coefficient of variation have also increased, indicating that the performance of the students has become more varied over the years. Overall, the data shows that the performance of the students in Masonry (MAS) trade has improved for some subjects (Concrete technology, Cost estimation, schedule, and site records) and remained relatively stable for others (Elevation and scaffolding operations, Masonry basic drawing). However, there has been a significant decline in the mean score for Tiles works, openings, and wall plastering. The standard deviation and coefficient of variation have increased for most subjects, indicating that the performance of the students has become more varied over the years.

Table 149: Pass rate in MAS trade by school ownership

MAS		2019		2021		2022	
		No.	%	No.	%	No.	%
Concrete technology	GA	821	97.9	1000	99.0	670	100.0
	PR	1750	88.7	1667	86.0	1751	98.9
	PU	851	96.6	852	96.7	689	99.6
Cost estimation, schedule and site records	GA	762	90.8	995	98.5	670	100.0
	PR	1161	58.8	1523	78.6	1712	96.7
	PU	693	78.7	824	93.5	687	99.3
Elevation and scaffolding operations	GA	833	99.3	1000	99.0	670	100.0
	PR	1889	95.7	1702	87.8	1759	99.4
	PU	872	99.0	861	97.7	692	100.0
Masonry basic drawing	GA	827	98.6	997	98.7	670	100.0
	PR	1807	91.6	1725	89.0	1749	98.8
	PU	857	97.3	852	96.7	690	99.7
Tiles works, openings and wall plastering	GA	832	99.2	1008	99.8	670	100.0
	PR	1917	97.2	1817	93.8	1749	98.8
	PU	873	99.1	870	98.8	692	100.0
Practical MAS	GA	836	99.6	1009	99.9	671	100.0
	PR	1963	99.5	1933	99.7	1755	99.2
	PU	878	99.7	879	99.8	691	99.9

Table 152 indicates the data for each subject by school ownership (GA, PR, and PU) over the years 2019, 2021, and 2022. Basing on the data given in the table above, it is noted that GA schools had consistently high passing rates for Concrete technology, with 97.9% in 2019, 99.0% in 2021, and 100.0% in 2022, PR schools also had consistently high passing rates, with 88.7% in 2019, 86.0% in 2021, and 98.9% in 2022, and then PU had high passing rates as well, with 96.6% in 2019, 96.7% in 2021, and 99.6% in 2022. The GA schools, had consistently high passing rates for Cost estimation, schedule and site records, with 90.8% in 2019, 98.5% in 2021, and 100.0% in 2022. But PR schools had low passing rates in 2019 (58.8%), but improved significantly in 2021 (78.6%) and 2022 (96.7%), while PU schools had high passing rates, with 78.7% in 2019, 93.5% in 2021, and 99.3% in 2022.

For Elevation and scaffolding operations, GA schools had consistently high passing rates, with 99.3% in 2019 and 99.0% in 2021, and 100.0% in 2022; PR schools had also high passing rates in 2019 (95.7%), but decreased significantly in 2021 (87.8%) before improving again in 2022 (99.4%) while PU schools has consistently

high passing rates, with 99.0% in 2019, 97.7% in 2021, and 100.0% in 2022. For Masonry basic drawing, GA schools had consistently high passing rates, with 98.6% in 2019, 98.7% in 2021, and 100.0% in 2022, and PR schools had high passing rates, with 91.6% in 2019, 89.0% in 2021, and 98.8% in 2022 while PU schools had high passing rates as well, with 97.3% in 2019, 96.7% in 2021, and 99.7% in 2022. For Tiles works, openings and wall plastering, the pass rates for all categories (GA, PR, PU) are consistently above 93% in all the years. The pass rates for GA and PU are consistently above 99%, with PR having a slightly lower pass rate in 2021. Similarly, for Practical MAS, the pass rates for all categories are consistently above 99%, with PU having the highest pass rate at 99.9% in 2021.

3.5.21 Computer Applications and Multimedia (MLM) Trade

This section provides summaries of the pass rate and performance of students in MLM national exam by gender and by type of school ownership. It also provides the total number of students registered in MLM for three years (2019, 2021 and 2023).

Table 150: Number of students who sat for (MLM) trade

Subjects	2019	2021	2022
2D drawing conceptions	94	193	273
Audio production and sound reinforcement	94	193	273
Digital images photography production	94	193	273
Practical MLM	94	193	273
Video operating and editing	94	193	273
Video pre-production	94	193	273

Table 150 shows the total number of students who sat for the Computer Applications and Multimedia (MLM) in National Exams across the six different subjects for three the years: 2019, 2021, and 2022. Across all the six subjects, there were 94 students who sat for the exam in 2019. In the subsequent two years, the number of students who sat for the exam increased substantially, with 193 students in 2021 and 273 students in 2022. This indicates a steady growth in interest in the MLM and that there is a growing demand for skills in this field

Interestingly, the number of students who sat for the exams for each of these subjects is consistent in each year across all the three years, with 94 students in 2019, 193 students in 2021, and 273 students in 2022.

Overall, the data in the table suggests that the MLM field is growing in popularity, as evidenced by the increase in the number of students who sat for the exams. However, it is also important to note that the number of students who sat for the exams for each specific subject within the MLM field has remained consistent in each year over the three-year period.

Table 151: Pass rate trend in MLM trade Core subjects

MLM	2019		2021		2022	
	No.	%	No.	%	No.	%
2D drawing conceptions	88	93.6	158	81.9	269	98.5
Audio production and sound reinforcement	86	91.5	157	81.3	269	98.5
Digital images photography production	88	93.6	151	78.2	273	100.0
Video operating and editing	87	92.6	166	86.0	271	99.3
Video pre-production	89	94.7	171	88.6	271	99.3
Practical MLM	94	100.0	190	98.4	273	100.0

Table 151 shows the percentage of students who passed in each subject in the MLM trade over the years 2019, 2021, and 2022. Overall, it can be observed that the percentage of students who passed each subject increased or remained consistently high over the years. Specifically, for the 2D drawing conceptions, the percentage of students who passed was 93.6% in 2019 and it decreased to 81.9% in 2021, and then increased again to 98.5% in 2022. Similarly, for Audio production and sound reinforcement, the percentage of students who passed was 91.5% in 2019, decreased to 81.3% in 2021, and then increased again to 98.5% in 2022. For Digital images photography production, the percentage of students who passed was consistently high, with 93.6% in 2019, 78.2% in 2021, and 100% in 2022.

The percentage of students who passed video operating and editing was 92.6% in 2019, increased to 86.0% in 2021, and then decreased slightly to 99.3% in 2022. For Video pre-production, the percentage of students who passed was consistently high, with 94.7% in 2019, 88.6% in 2021, and 99.3% in 2022. Finally, for practical MLM, the percentage of students who passed was consistently high, with 100% in 2019 and 2022, and 98.4% in 2021. Overall, it can be concluded that the majority of students in the MLM trade have been successful in passing each subject over the years, with some variation in the percentages across the different subjects and years.

Table 152: Pass rate in MLM by Gender

MLM		2019		2021		2022	
		No.	%	No.	%	No.	%
2D drawing conceptions	Female	42	93.3	85	81.7	119	97.5
	Male	46	93.9	73	82.0	150	99.3
Audio production and sound reinforcement	Female	40	88.9	81	77.9	118	96.7
	Male	46	93.9	76	85.4	151	100.0
Digital images photography production	Female	41	91.1	75	72.1	122	100.0
	Male	47	95.9	76	85.4	151	100.0
Practical MLM	Female	45	100.0	102	98.1	122	100.0
	Male	49	100.0	88	98.9	151	100.0
Video operating and editing	Female	41	91.1	86	82.7	121	99.2
	Male	46	93.9	80	89.9	150	99.3
Video pre-production	Female	44	97.8	92	88.5	121	99.2
	Male	45	91.8	79	88.8	150	99.3

Based on the given data in table 152, it can be noted that the trade 2D Drawing conceptions, both males and females have consistently high pass rates. In 2019, 93.3% of females and 93.9% of males passed, while in 2021, 81.7% of females and 82.0% of males passed. However, in 2022, the pass rates increased significantly, with 97.5% of females and 99.3% of males passing. For audio production and sound reinforcement, we can see that females had a slightly lower pass rate than males in 2019 and 2021, but both genders had a high pass rate overall. In 2019, 88.9% of females and 93.9% of males passed, while in 2021, 77.9% of females and 85.4% of males passed. In 2022, the pass rates increased significantly, with 96.7% of females and 100% of males passing. For digital images photography production, both males and females had consistently high pass rates in 2019 and 2021, but females had a lower pass rate in 2021. In 2019, 91.1% of females and 95.9% of males passed, while in 2021, 72.1% of females and 85.4% of males passed. However, in 2022, both genders had a perfect pass rate of 100%. For video operating and editing, both males and females had consistently high pass rates in all years, but females had a lower pass rate in 2021. In 2019, 91.1% of females and 93.9% of males passed, while in 2021, 82.7% of females and 89.9% of males passed. However, in 2022, both genders had a high pass rate of 99.2%. For video pre-production, females had a higher pass rate than males in 2019 and 2021, but males had a higher pass rate in 2022. In 2019, 97.8% of the females and 91.8% of the males passed, while in 2021, 88.5% of the females and 88.8% of the males passed. However, in 2022, both genders had a high pass rate of 99.3%. For practical MLM, both males and females had a perfect pass rate of 100% in 2019 and 2022 but there is a slight decrease in pass rate for both female and male in 2021.

Overall, it is observed that both males and females had high pass rates in most subjects, with some variations between genders across the three years.

Table 153: Average score, SD and VC of scores in MLM trade

MLM		2019	2021	2022
2D drawing conceptions	Mean	58.2	57.45	58.8
	SD	12.1	19.12	18.9
	VC	20.7	33.27	32.2
Audio production and sound reinforcement	Mean	54.1	62.17	62.8
	SD	11.3	16.61	19.6
	VC	20.9	26.71	31.2
Digital images photography production	Mean	62.4	64.19	62.9
	SD	13.7	15.90	14.7
	VC	21.9	24.77	23.5
Video operating and editing	Mean	59.7	67.28	72.8
	SD	13.5	16.09	16.0
	VC	22.6	23.91	21.9
Video pre-production	Mean	63.8	72.20	64.5
	SD	12.0	14.60	20.4
	VC	18.8	20.22	31.6
Practical MLM	Mean	93.0	91.82	90.2
	SD	5.3	5.47	6.3
	VC	5.7	5.96	7.0

Table 153 shows the mean, standard deviation (SD), and coefficient of variation (CV) for five different subjects in MLM for the years 2019, 2021, and 2022, as well as for practical MLM. Here are some observations: For 2D drawing conceptions, the mean score decreased slightly from 58.2 in 2019 to 57.45 in 2021, but then increased again to 58.8 in 2022. The standard deviation and coefficient of variation (CV) also decreased in 2021 but increased again in 2022. For audio production and sound reinforcement, the mean score increased steadily from 54.1 in 2019 to 62.8 in 2022. The standard deviation and coefficient of variation (CV) also increased over the same period. For Digital images photography production, the mean score remained relatively stable, with a slight increase from 62.4 in 2019 to 64.19 in 2021 and then a slight decrease to 62.9 in 2022. The standard deviation and coefficient of variation (CV) also remained relatively stable. For video operating and editing, the mean score increased significantly from 59.7 in 2019 to 67.28 in 2021 and then even more to 72.8 in 2022. The standard deviation and coefficient

of variation (CV) remained relatively stable. For video pre-production, the mean score increased significantly from 63.8 in 2019 to 72.20 in 2021 but then decreased to 64.5 in 2022. The standard deviation increased in 2021 and decreased again in 2022, while the variance coefficient increased steadily over the period. For practical MLM, the mean score decreased slightly from 93.0 in 2019 to 91.82 in 2021 and then decreased again to 90.2 in 2022. The standard deviation and coefficient of variation (CV) increased steadily over the same period. Overall, the performance of MLM participants in the various skills assessed is mixed, with some skills improving over time, while others remain relatively stable or even decline. Practical MLM shows a slight decline in performance over the period, which may be a cause for concern. It is important to note, however, that these observations are based on a limited dataset and further analysis would be necessary to draw more conclusive insights.

Table 154: Pass rate in MLM trade by school ownership

MLM		2019		2021		2022	
		No.	%	No.	No.	%	No.
2D drawing conceptions	GA	38	100.0	55	94.8	59	100.0
	PR	50	89.3	103	76.3	195	98.5
Audio production and sound reinforcement	GA	38	100.0	56	96.6	59	100.0
	PR	48	85.7	101	74.8	194	98.0
Digital images photography production	GA	37	97.4	55	94.8	59	100.0
	PR	51	91.1	96	71.1	198	100.0
Video operating and editing	GA	37	97.4	55	94.8	59	100.0
	PR	50	89.3	111	82.2	196	99.0
Video pre-production	GA	38	100.0	56	96.6	59	100.0
	PR	51	91.1	115	85.2	196	99.0
Practical MLM	GA	38	100.0	56	96.6	59	100.0
	PR	56	100.0	134	99.3	198	100.0

Table 157 shows the frequency and percentage of students who passed Multimedia (MLM) trade at two school ownership (GA and PR), over a three-year period (2019, 2021, and 2022). In general, both GA and PR schools had high pass rates in all MLM trade over the three-year period. However, there are some differences in the pass rates between the two school's ownership (GA and PR) and between different MLM trades. For the MLM trades, it can be observed that in all trades, the pass rate was consistently high for both schools across the three years.

In 2D drawing conceptions, audio production and sound reinforcement, digital images photography production, video operating and editing, and video pre-production trades, GA school had a slightly higher pass rate than PR school in 2019 and 2021. However, the pass rates of both school ownership were almost equal in 2022. For Practical MLM, both GA and PR schools had a 100% pass rate across the three years. This suggests that this trade may be easier to pass or that both schools are offering the trade effectively. Overall, the data suggests that both schools are performing well in teaching MLM trades, and the pass rates of students have been consistently high over the three years.

3.5.22 Mechanical Production Technology (MPT) Trade

This section provides information on the number of students who sat for the National Exams for trade Mechanical Production Technology (MPT) trade across the three years: 2019, 2021, and 2022. The data is presented for six different subjects that were tested in the National Exams.

Table 155: Number of students who sat the exam in MPT trade

Subjects	2019	2021	2022
Hydraulic and pneumatic systems	155	135	158
Machine elements description	155	135	158
Machine tools operations	155	135	158
Practical MPT	155	135	140
Technical and assembly details drawing	155	135	158
Welding technology	155	135	158

From Table 155 , it can be noted note is that the total number of students who sat for the different subjects in MPT are at 155 in 2019; decrease at 135 students in 2021. However, there was a slight increase in the total number of students attending MPT trades in 2022, which rose to 158 across all six subjects.

When analyzing the individual subjects, we can see that the total number of students remained the same in each year across all three years for five out of six subjects. The only exception is practical MPT, which decreased from 155 in 2019 to 135 in 2021, and then slightly increased to 140 in 2022.

In conclusion, the table shows that the total number of students attending trades in MPT remained relatively constant in each year across the three years, except for a slight increase in 2022. While most subjects saw no significant changes in the number of students attending, there was a decrease in practical MPT attendance in 2021, which slightly rebounded in 2022.

Table 156: Pass rate in MPT trade subjects

MPT	2019		2021		2022	
	No.	%	No.	%	NO.	%
Hydraulic and pneumatic systems	77	49.7	114	84.4	139	88.0
Machine elements description	73	47.1	103	76.3	139	88.0
Machine tools operations	111	71.6	114	84.4	139	88.0
Technical and assembly details drawing	113	72.9	120	88.9	138	87.3
Welding technology	143	92.3	114	84.4	158	100.0
Practical MPT	152	98.1	135	100.0	140	100.0

Table 156 shows the pass rate for the six different subjects for Mechanical Production Technology (MPT) over the years 2019, 2021, and 2022. For the subject of Hydraulic and pneumatic systems, it has registered an increase of the pass rate from 49.7% in 2019 to 84.4% in 2021, and then a further increase to 88.0% in 2022. Similarly, for Machine elements description, there is also an increase in the pass rate from 47.1% in 2019 to 76.3% in 2021, and then a further increase to 88.0% in 2022. For the subject of Machine tools operations, the pass rate has remained consistent at 71.6% in 2019, 84.4% in 2021, and 88.0% in 2022. In the case of Technical and assembly details drawing, we can observe an increase in the pass rate from 72.9% in 2019 to 88.9% in 2021, and then a slight decrease to 87.3% in 2022. For the subject of Welding technology, we can see a high pass rate of 92.3% in 2019, which decreased to 84.4% in 2021, but then increased to 100.0% in 2022. Finally, for Practical MPT, we can observe a consistently high pass rate of 98.1% in 2019, 100.0% in 2021, and 100.0% in 2022. Overall, we can see that the pass rates have improved or remained consistent across all subjects except for Technical and assembly details drawing, where there was a slight decrease in the pass rate in 2022.

Table 157: Pass rate in MPT by Gender

MPT		2019		2021		2022	
		No.	%	No.	%	No.	%
Hydraulic and pneumatic systems	Female	11	45.8	9	64.3	20	100.0
	Male	66	50.4	105	86.8	119	86.2
Machine elements description	Female	11	45.8	9	64.3	20	100.0
	Male	62	47.3	94	77.7	119	86.2
Machine tools operations	Female	18	75.0	9	64.3	20	100.0
	Male	93	71.0	105	86.8	119	86.2
Technical and assembly details drawing	Female	15	62.5	11	78.6	20	100.0
	Male	98	74.8	109	90.1	118	85.5
Welding technology	Female	22	91.7	8	57.1	20	100.0
	Male	121	92.4	106	87.6	138	100.0
Practical MPT	Female	24	100.0	14	100.0	20	100.0
	Male	128	97.7	121	100.0	120	100.0

Table 157 shows the frequency and percentage of students who passed the Mechanical Production Technology (MPT) trade in different subjects over three years (2019, 2021, and 2022) based on gender. Looking at the table, we can see that in general, the number of male students who passed the exams is higher than female students. However, the pass rate for female students has increased over the three years, with all subjects having a 100% pass rate in 2022. On the other hand, the pass rate for male students has remained consistently high across all subjects over the three years. For Hydraulic and pneumatic systems, both male and female students have shown improvement in pass rate, with the highest increase in pass rate for female students from 45.8% in 2019 to 100% in 2022. For Machine elements description, Machine tools operations, and Technical and assembly details drawing, both male and female students have shown improvement in pass rate, with all subjects having a 100% pass rate in 2022 for female students.

For Welding technology, female students showed a high pass rate of 91.7% in 2019, but their pass rate decreased to 57.1% in 2021 before increasing again to 100% in 2022. Male students consistently showed a high pass rate across all three years. For Practical MPT, all students (male and female) consistently showed a 100% pass rate across all three years. In conclusion, while there is a gender disparity in terms of the number of students passing the exams, both male and female students have shown improvement in pass rates over the three years, with female students consistently achieving a 100% pass rate in all subjects in 2022.

Table 158: Average score, SD & VC of scores in MPT trade

MPT		2019	2021	2022
Hydraulic and pneumatic systems	Mean	42.3	44.7	69.7
	SD	23.1	9.9	23.7
	VC	54.7	22.3	34.0
Machine elements description	Mean	42.3	47.6	48.7
	SD	22.7	22.2	19.9
	VC	53.6	46.6	40.9
Machine tools operations	Mean	56.7	65.0	60.4
	SD	23.2	17.5	25.2
	VC	40.9	26.9	41.7
Technical and assembly details drawing	Mean	55.6	56.7	55.3
	SD	21.7	14.7	21.9
	VC	38.9	25.8	39.6
Welding technology	Mean	74.0	66.4	67.3
	SD	20.1	14.2	19.0
	VC	27.2	21.4	28.3
Practical MPT	Mean	93.7	93.6	94.6
	SD	9.3	4.7	4.0
	VC	10.0	5.0	4.2

Table 158 shows the mean, standard deviation (SD), and coefficient of variation (CV) for different subjects in MPT trade for the years 2019, 2021, and 2022. Based on the data provided in the table, we can observe the following trends over the three years:

Hydraulic and pneumatic systems: The mean score has significantly improved from 42.3 in 2019 to 44.7 in 2021 and further increased to 69.7 in 2022. The standard deviation (SD) has also increased over the years, indicating greater variability in the scores. The coefficient of variation (CV) has decreased from 54.7 in 2019 to 22.3 in 2021 and further decreased to 34.0 in 2022.

Machine elements description: The mean score has remained relatively stable over the years, with a slight increase from 42.3 in 2019 to 47.6 in 2021, followed by a slight decrease to 48.7 in 2022. The SD has also fluctuated over the years, with the highest value in 2019 and the lowest in 2021. The CV has decreased from 53.6 in 2019 to 40.9 in 2022.

Machine tools operations: The mean score has increased from 56.7 in 2019 to 65.0 in 2021, followed by a slight decrease to 60.4 in 2022. The SD has also fluctuated over the years, with the highest value in 2019 and the lowest in 2021. The CV has decreased from 40.9 in 2019 to 26.9 in 2021, but increased to 41.7 in 2022.

Technical and assembly details drawing: The mean score has remained relatively stable over the years, with a slight increase from 55.6 in 2019 to 56.7 in 2021, followed by a slight decrease to 55.3 in 2022. The SD has also fluctuated over the years, with the highest value in 2019 and the lowest in 2021. The CV has decreased from 38.9 in 2019 to 25.8 in 2021, but increased to 39.6 in 2022. Welding technology: The mean score has decreased from 74.0 in 2019 to 66.4 in 2021, followed by a slight increase to 67.3 in 2022. The SD has also fluctuated over the years, with the highest value in 2019 and the lowest in 2022. The CV has decreased from 27.2 in 2019 to 21.4 in 2021, but increased to 28.3 in 2022. Practical MPT: The mean score has remained consistently high over the years, with a slight increase from 93.7 in 2019 to 93.6 in 2021, followed by a slight increase to 94.6 in 2022. The SD has decreased over the years, indicating greater consistency in the scores. The CV has also decreased over the years, indicating greater uniformity in the scores. In summary, it is clear that while the performance of the student in hydraulic and pneumatic systems has greatly improved over the years, performance in welding technology has slightly decreased and then slightly increased. The other subjects have shown relatively stable performance.

Table 159: Average score, SD & VC of scores in MPT trade

MPT		2019		2021		2022	
		No.	%	No.	%	No.	%
Hydraulic and pneumatic systems	PU	77	49.7	114	84.4	138	93.2
Machine elements description	PU	73	47.1	103	76.3	138	93.2
Machine tools operations	PU	111	71.6	114	84.4	138	93.2
Technical and assembly details drawing	PU	113	72.9	120	88.9	137	92.6
Welding technology	PU	143	92.3	114	84.4	148	100.0
Practical MPT	PU	152	98.1	135	100.0	139	100.0

Table 159 indicates that there were only public schools in Mechanical Production Technology (MPT) trade. The table represents the frequency and percentage of students that passed different subjects in MPT (Mechanical Production Technology) for the three consecutive years (2019, 2021, 2022). By examining the statistics, it is observed that the pass rate has increased over time in all subjects. Hydraulic and pneumatic systems, machine elements description, and machine

tools operations have recorded a significant improvement in the pass rates from 2019 to 2022, with pass rates rising from 49.7% to 93.2%. The pass rate for Technical and assembly details drawing increased from 72.9% to 92.6%. Additionally, Welding technology has also improved, with a pass rate of 100.0% in 2022. Practical MPT has the greatest pass rate over the trade of the three years, with scores of 98.1%, 100%, and 100% in 2019, 2021, and 2022, respectively. Overall, the data suggests that there has been an improvement in the pass rates of MPT subjects over the years, indicating a positive trend in student performance in the trade.

3.5.23 Music (MUS) trade

In this section, students' exam results in MUS were analyzed. The total number of students who sat for the National Exams in the trade of Music (MUS) in the three years is given in the table below.

Table 160: Number of students registered in the trade of Music (MUS)

Subjects	2019	2021	2022
Music business	21	35	46
Music composition and orchestration	21	35	46
Music instrument	21	35	46
Music notation and transcription	21	35	46
Music repertoire and performance	21	35	46
Practical MUS	21	35	46
Vocal skills	21	35	46
Workplace English	21	35	46
Workplace French	21	35	46
Workplace Kinyarwanda	21	35	46

As indicated in the above table, across all subjects, the number of students who sat for the exam increased in 2021, and then remained the same in 2022. Specifically, in 2019, there were 21 students who sat for the exams in each subject, and this number increased to 35 in 2021 and increased again to 46 in 2022. This suggests that there was an overall increase in student enrollment in the trade of Music across the three years. Furthermore, it appears that the subjects that saw an increase in enrollment from 2019 to 2022 may have been more popular among students or may have been subjects that were in higher demand in the job market. The table provides a snapshot of the enrollment trends in the trade of Music over the three years and highlights the subjects that experienced an increase in student enrollment.

Table 161: Pass rate trend in Music trade core subjects

Subjects in (MUS)	2019		2021		2022	
	No.	%	No.	%	No.	%
Music business	20	95.2	34	97.1	44	95.7
Music composition and orchestration	18	85.7	32	91.4	43	93.5
Music instruments	21	100.0	34	97.1	46	100.0
Music notation and transcription	20	95.2	34	97.1	44	95.7
Music repertoire and performance	21	100.0	34	97.1	46	100.0
Vocal skills	21	100.0	34	97.1	45	97.8
Workplace English	20	95.2	32	91.4	44	95.7
Workplace French	12	57.1	25	71.4	15	32.6
Workplace Kinyarwanda	21	100.0	35	100.0	46	100.0
Practical MUS	21	100.0	35	100.0	43	93.5

According to table 161, most subjects pass rates increased between 2019 and 2021, with some subjects maintaining a high pass rate over the three-year period. However, there was a decline in the pass rate for Workplace French from 71.4% in 2021 to 32.6% in 2022. The subject with the highest pass rate consistently over the three years is Music Instruments, with a perfect pass rate of 100%. This is followed closely by Vocal Skills and Music Repertoire and Performance, both of which had a pass rate of 100% in 2021 and 2022, but had a slightly lower pass rate of 97.1% in 2019. Music Composition and Orchestration has registered a steady increase in pass rates from 85.7% in 2019 to 93.5% in 2022. Music Business has also recorded a high pass rate consistently over the three years, with a slight dip from 97.1% in 2021 to 95.7% in 2022. Music Notation and Transcription and Workplace English have shown consistent pass rates over the three-year period, with only minor fluctuations. Practical MUS maintained a high pass rate of 100% in 2019 and 2021, however in 2022, this percentage dropped to 93.5%.

Overall, there is a positive trend in the performance of most subjects, with the exception of Workplace French showing a decline in pass rates. The consistently high pass rates for Music Instruments, Vocal Skills, Music Repertoire and Performance, and Music Business indicate that these subjects are well-taught and well-understood by the students

Table 162: Pass rate by Gender in MUS

Subjects		2019		2021		2022	
		No.	%	No.	No.	%	No.
Music business	Female	7	87.5	7	100.0	15	100.0
	Male	13	100.0	27	96.4	29	93.6
Music composition and orchestration	Female	6	75.0	7	100.0	15	100.0
	Male	12	92.3	25	89.3	28	90.3
Music instruments	Female	8	100.0	7	100.0	15	100.0
	Male	13	100.0	27	96.4	31	100.0
Music notation and transcription	Female	8	100.0	7	100.0	15	100.0
	Male	12	92.3	27	96.4	29	93.6
Music repertoire and performance	Female	8	100.0	7	100.0	15	100.0
	Male	13	100.0	27	96.4	31	100.0
Vocal skills	Female	8	100.0	7	100.0	15	100.0
	Male	13	100.0	27	96.4	30	96.8
Workplace English	Female	7	87.5	7	100.0	15	100.0
	Male	13	100.0	25	89.3	29	93.6
Workplace French	Female	4	50.0	5	71.4	6	40.0
	Male	8	61.5	20	71.4	9	29.0
Workplace Kinyarwanda	Female	8	100.0	7	100.0	15	100.0
	Male	13	100.0	28	100.0	31	100.0
Practical MUS	Female	8	100.0	7	100.0	14	93.3
	Male	13	100.0	28	100.0	29	93.6

According to Table 162, it can be observed that there are several subjects listed, each with a percentage indicating the pass rate for females and males for the three different academic years (2019, 2021, and 2022). Here are some observations:

Music Business: In both years, the pass rate for females was consistently higher than that for males, with 100% in the last two years. The pass rate for males decreased slightly from 100% in 2019 to 93.6% in 2022. **Music Composition and Orchestration:** The pass rate for both males and females improved from 2019 to 2021, and remained at 100% for females in 2022. For males, the pass rate decreased slightly from 92.3% in 2019 to 90.3% in 2022. **Music Instruments:** Both males and females had a pass rate of 100% across all three years. **Music Notation and Transcription:** Both males and females had a pass rate of 100% across all three years, except for a slight dip to 93.6% for males in 2022. **Music Repertoire and Performance:** Both

males and females had a pass rate of 100% across all the three years, except for a slight dip to 96.4% for males in 2021.

Vocal Skills: Both males and females had a pass rate of 100% across all three years, except for a slight dip to 96.8% for males in 2022. Workplace English: Both males and females had a pass rate of 100% in the last two years, with a slight increase for males from 89.3% in 2021 to 93.6% in 2022.

Workplace French: The pass rate for females improved from 50% in 2019 to 71.4% in 2021, but then decreased sharply to 40% in 2022. For males, the pass rate fluctuated between 29% and 71.4% across the three years. Workplace Kinyarwanda: Both males and females had a pass rate of 100% across all three years.

Looking at the table, we can see that the pass rates for Practical MUS have been consistently high for both male and female students across all three academic years. In 2019, both male and female students had a 100% pass rate in Practical MUS. In the 2021 academic year, both male and female students had a 100% pass rate as well. However, in the 2022 academic year, the pass rate for Practical MUS dropped slightly to 93.3% for female students and 93.6% for male students.

Table 163: Average score, SD & CV in MUS trade

Subjects of MUS		2019	2021	2022
Music Business	Mean	69.6	69.3	66.4
	SD	13.7	17.2	18.1
	VC	19.7	24.9	27.3
Music Composition and Orchestration	Mean	47.9	56.1	48.0
	SD	8.9	14.5	17.0
	VC	18.6	25.9	35.4
Music instruments	Mean	84.1	75.6	66.2
	SD	8.1	12.8	16.1
	VC	9.6	16.9	24.3
Music Notation and transcription	Mean	71.6	66.7	48.7
	SD	14.3	13.5	17.8
	VC	20.0	20.3	36.5
Music Repertoire and Performance	Mean	79.1	63.4	61.4
	SD	5.6	12.3	16.7
	VC	7.0	19.3	27.2

Vocal skills	Mean	68.7	68.4	51.8
	SD	14.4	13.1	17.9
	VC	20.9	19.1	34.5
Workplace English	Mean	65.6	61.5	67.9
	SD	14.2	18.2	15.4
	VC	21.7	29.6	22.6
Workplace French	Mean	46.3	36.3	34.2
	SD	18.8	23.1	18.2
	VC	40.7	63.8	53.1
Workplace Kinyarwanda	Mean	82.1	66.2	76.4
	SD	6.7	8.1	10.8
	VC	8.1	12.2	14.2
Practical MUS	Mean	87.2	90.1	86.6
	SD	10.3	5.6	9.6
	VC	11.8	6.2	11.1

From Table 163, it can be observed that there were some fluctuations in the mean scores and standard deviations across different subjects. Here are some specific observations: Music Business: The mean score has decreased from 69.6 in 2019 to 66.4 in 2022, with an increase in standard deviation from 13.7 to 18.1. This suggests that the performance in Music Business has declined over time, and the variability in scores has also increased. Music Composition and Orchestration: The mean score has increased from 47.9 in 2019 to 56.1 in 2021, but then decreased to 48.0 in 2022. The standard deviation has also increased from 8.9 to 17.0 over the three years. This suggests that the performance in Music Composition and Orchestration has been inconsistent over time, with a significant drop in the most recent year. Music Instruments: The mean score has decreased from 84.1 in 2019 to 66.2 in 2022, with an increase in standard deviation from 8.1 to 16.1. This suggests that the performance in Music Instruments has declined significantly over time, and the variability in scores has also increased. Music Notation and Transcription: The mean score has decreased from 71.6 in 2019 to 48.7 in 2022, with an increase in standard deviation from 14.3 to 17.8. This suggests that the performance in Music Notation and Transcription has declined significantly over time, and the variability in scores has also increased. Music Repertoire and Performance: The mean score has decreased from 79.1 in 2019 to 61.4 in 2022, with an increase in standard deviation from 5.6 to 16.7. This suggests that the performance in Music Repertoire and Performance has declined significantly over time, and the variability in scores has also increased. Vocal Skills: The mean score has decreased from 68.7 in 2019 to 51.8 in 2022, with an increase in standard deviation from 14.4 to 17.9. This suggests

that the performance in Vocal Skills has declined significantly over time, and the variability in scores has also increased. Workplace English: The mean score has decreased slightly from 65.6 in 2019 to 67.9 in 2022, but the standard deviation has increased from 14.2 to 15.4. This suggests that the performance in Workplace English has been relatively consistent over time, with a slight improvement in the most recent year. Workplace French: The mean score has decreased from 46.3 in 2019 to 34.2 in 2022, with an increase in standard deviation from 18.8 to 18.2. This suggests that the performance in Workplace French has declined significantly over time, but the variability in scores has remained relatively stable. Workplace Kinyarwanda: The mean score has decreased slightly from 82.1 in 2019 to 76.4 in 2022, but the standard deviation has increased from 6.7 to 10.8. This suggests that the performance in Workplace Kinyarwanda has been relatively consistent over time, with a slight decline in the most recent year. Practical MUS: The mean score for Practical MUS in 2019 was 87.2 with a standard deviation of 10.3 and a variance coefficient of 11.8%. In 2021, the mean score increased to 90.1 with a lower standard deviation of 5.6 and a variance coefficient of 6.2%. However, in 2022, the mean score decreased to 86.6 with a higher standard deviation of 9.6 and a variance coefficient of 11.1%.

Table 164: Pass rate in MUS trade by school ownership

MUS		2019		2021		2022	
		No.	%	No.	%	No.	%
Music Business	PU	20	95.2	34	97.1	44	95.7
Music Composition and Orchestration	PU	18	85.7	32	91.4	43	93.5
Music instruments	PU	21	100.0	34	97.1	46	100.0
Music Notation and transcription	PU	20	95.2	34	97.1	44	95.7
Music Repertoire and Performance	PU	21	100.0	34	97.1	46	100.0
Vocal skills	PU	21	100.0	34	97.1	45	97.8
Workplace English	PU	20	95.2	32	91.4	44	95.7
Workplace French	PU	12	57.1	25	71.4	15	32.6
Workplace Kinyarwanda	PU	21	100.0	35	100.0	46	100.0
Practical MUS	PU	21	100.0	35	100.0	43	93.5

Table 164, shows the pass rates for different music-related trades offered in only public schools for the years 2019, 2021, and 2022. Overall, it's observed that the pass rates for most trades have remained consistently high over the three-year period, with most trades having a pass rate of 95% or higher. In particular, the

trades “Music instruments”, “Music Repertoire and Performance”, “Vocal skills”, and “Workplace Kinyarwanda” all had a pass rate of 100% in all three years. However, there are a few trades that show some variation in their pass rates over the years. For example, “Workplace French” had a pass rate of 57.1% in 2019, which increased to 71.4% in 2021, but then dropped significantly to 32.6% in 2022. Similarly, “Practical MUS” had a pass rate of 100% in the first two years but dropped to 93.5% in 2022.

However, it would be interesting to see how these pass rates compare to those of other schools offering similar music-related trades in the region or country, to get a better sense of how the school is performing relative to its peers.

3.5.24 Networking (NET) Trade

In this section, students’ exam results in NET were analyzed. The total number of students who sat for the National Exams in the trade of NET in the three years is given in the table below.

Table 165: Number of students who sat the exam of Networking (NET)

Subjects	2019	2021	2022
Install and configure wireless network	1080	1377	1561
LAN setup and network maintenance	1080	1377	1561
Network and system administration	1080	1377	1561
Practical NET	1080	1377	1561
Routers and switches installation and operations	1080	1377	1561
Telecommunication and audio-visual devices	1080	1377	1561

Table 165 provides the total number of students who sat for the Networking (NET) National Exams across the three years, from 2019 till 2022, in the six different subjects. The subjects are listed in the left column, and the years are displayed in the top row.

The data shows that there was no variation in the number of students who sat for the exam in each of the six subjects for each year over the three years. The number of students attending each subject remained constant at 1080 in 2019, 1377 in 2021, and 1561 in 2022. The table shows that the total number of students who sat for the Networking (NET) Trade has increased steadily over the years. All the six subjects have registered an increase in the number of students sitting for exams from 2019 to 2022.

The data suggests that the Networking (NET) program is becoming increasingly popular among students. The steady increase in the number of students sitting for the exams in each subject over the years indicates a growing demand for skills related to networking.

Overall, this data could be useful for educational institutions and policymakers who are looking to understand the trends and patterns in student's enrollment in Networking trades and plan their educational offerings accordingly.

Table 166: Pass rate trend in Net Working Trade Core subjects

NET	2019		2021		2022	
	No.	%	No.	%	No.	%
Install and configure wireless network	908	84.1	1219	88.5	1,467	94.1
LAN setup and network maintenance	929	86.0	1154	83.8	1,510	97.0
Network and system administration	909	84.2	1177	85.5	1,479	95.0
Routers and switches installation and operations	666	61.7	1207	87.7	1,457	93.5
Telecommunication and audio-visual devices	564	52.2	1059	76.9	1,504	96.6
Practical NET	1069	99.0	1374	99.8	1,559	99.9

Based on the data presented in table 166, it appears that there has been an overall increase in the frequency of performance in NET trade across all subjects between 2019 and 2022. This suggests an improvement in the overall performance of NET trade. The “Install and configure wireless network subject” had the lowest pass rate in 2019, with 84.1% of candidates passing, but this percentage increased progressively reaching to 94.1% in 2022, which is a significant improvement. Similarly, “LAN setup and network maintenance” and “Network and system administration” saw an increase in pass rates from 86.0% to 97.0% and 84.2% to 95.0% respectively. The “Routers and switches installation and operations” had a lower pass rate in 2019, with only 61.7% of candidates passing and increase in percentage has been marked progressively where percentage increased to 93.5% in 2022. “Telecommunication and audio-visual devices” also saw an increase in pass rates from 52.2% to 96.6%. Finally, the category of “Practical NET” had a near-perfect pass rate across all years, with 99.0% passing in 2019 and 99.8% passing in 2021 and 99.9% passing in 2022. This suggests that candidates generally performed well in practical assessments. Generally, there has been a positive trend in the performance of NET trade across all the years.

Table 167: Pass rate in Networking trade by Gender

NET		2019		2021		2022	
		No.	%	No.	%	No.	%
Install and configure wireless network	Female	413	82.6	515	84.7	631	91.7
	Male	495	85.3	711	91.2	836	96.0
LAN setup and network maintenance	Female	410	82.0	484	79.6	661	96.1
	Male	519	89.5	677	86.8	849	97.7
Network and system administration	Female	403	80.6	512	84.2	634	92.2
	Male	506	87.2	669	85.8	845	97.2
Routers and switches installation and operations	Female	283	56.6	530	87.2	651	94.6
	Male	383	66.0	683	87.6	806	92.5
Telecommunication and audio-visual devices	Female	236	47.2	432	71.1	656	95.4
	Male	328	56.6	633	81.2	848	97.6
Practical NET	Female	498	99.6	608	100.0	686	99.7
	Male	571	98.4	777	99.6	873	100.0

According to the data presented in table 167, shows the general performance trends in NET trade for female and male candidates: Install and configure wireless network: Both male and female candidates have shown an increasing trend in passing the exam from 2019 to 2022. However, male candidates have consistently outperformed female candidates, with a higher pass rate except in 2021 in Practical NET and in 2022 in Routers and switches installation and operations. LAN setup and network maintenance: Female candidates have shown a decreasing trend in passing the exam from 2019 to 2021, but have made a significant improvement in 2022 with a pass rate of 96.1%. Male candidates, on the other hand, have consistently performed well in this category, with a pass rate of 97.7% in 2022. Network and system administration: Both male and female candidates have shown an increasing trend in passing the exam from 2019 to 2022. However, male candidates have consistently outperformed female candidates, with a higher pass rate in each year. Routers and switches installation and operations: Both male and female candidates have shown an increasing trend in passing the exam from 2019 to 2021. However, female candidates have shown a significant improvement in 2022, with a pass rate of 94.6 while male had a slight decrease with 92.5 but generally male consistently outperformed female candidates, with a higher pass rate. Telecommunication and audio-visual devices: Female candidates have shown a decreasing trend in passing the exam from 2019 to 2021, but have made a significant improvement in 2022 with a pass rate of 95.4%. Male candidates, on the other hand, have consistently performed well in this category, with a pass rate of 97.6% in 2022.

Practical NET: Both male and female candidates have consistently performed well in this category, with a pass rate of over 98.4% to 100% in each year. Male candidates have consistently outperformed female candidates in most categories, with higher pass rates in each year. However, female candidates have shown significant improvements.

Table 168: Average score, SD & CV of scores in Networking trade

NET		2019	2021	2022
Install and Configure Wireless Network	Mean	60.2	66.2	60.8
	SD	17.9	19.5	23.5
	VC	29.8	29.4	38.6
LAN Setup and Network Maintenance	Mean	54.0	66.8	65.7
	SD	16.5	17.1	21.7
	VC	30.6	25.5	33.0
Network and System Administration	Mean	57.6	55.8	54.3
	SD	16.5	19.0	22.7
	VC	28.7	34.0	41.8
Routers and Switches Installation and Operations	Mean	46.7	64.5	59.2
	SD	19.3	20.1	23.2
	VC	41.3	31.2	39.1
Telecommunication and Audio-visual devices	Mean	36.0	44.5	57.9
	SD	15.9	18.3	19.8
	VC	44.4	41.2	34.2
Practical NET	Mean	94.1	96.0	95.8
	SD	6.9	5.2	4.0
	VC	7.3	5.4	4.2

Table 168 shows the general performance based on Mean, SD and VC in NET trade, For “Install and Configure Wireless Network,” it can be observed that the mean score increased from 60.2 in 2019 to 66.2 in 2021 and then decreased to 60.8 in 2022. The SD also increased over time, indicating more variability in the scores. The VC was highest in 2022, indicating the highest relative variability compared to the mean score, for “LAN Setup and Network Maintenance,” mean score increased from 54.0 in 2019 to 66.8 in 2021 and then slightly decreased to 65.7 in 2022. The SD and VC also increased over time, indicating more variability in the scores.

For “Network and System Administration,” the mean score decreased over time,

from 57.6 in 2019 to 55.8 in 2021 and then to 54.3 in 2022. The SD and VC also increased over time, indicating more variability in the scores. For “Routers and Switches Installation and Operations,” mean score increased from 46.7 in 2019 to 64.5 in 2021 and then slightly decreased to 59.2 in 2022. The SD and VC were highest in 2019, indicating the highest variability in the scores. In “Telecommunication and Audio-visual devices,” it was observed that the mean score increased over time, from 36.0 in 2019 to 44.5 in 2021 and then to 57.9 in 2022. The SD and VC were highest in 2019 and decreased over time, indicating less variability in the scores. For “Practical NET,” the mean score was consistently high over time, with a slight increase from 94.1 in 2019 to 96.0 in 2021 and then to 95.8 in 2022. The SD and VC were lowest in this category, indicating less variability in the scores.

The scores in most categories increased over time, indicating an improvement in performance in NET trade. However, there was also more variability in the scores, as indicated by the increasing SD and VC in most categories. This may suggest that the performance in some areas is more inconsistent than others.

Table 169: Pass rate in Networking Trade by school ownership

NET		2019		2021		2022	
		No.	%	No.	%	No.	%
Install and configure wireless network	GA	141	100.0	108	100.0	178	99.4
	PR	631	82.8	906	86.3	1042	93.8
	PU	126	89.4	192	98.0	224	97.0
LAN setup and network maintenance	GA	141	100.0	107	99.1	178	99.4
	PR	640	84.0	840	80.0	1078	97.0
	PU	140	99.3	192	98.0	227	98.7
Network and system administration	GA	139	98.6	107	99.1	178	99.4
	PR	632	82.9	868	82.7	1054	94.9
	PU	132	93.6	194	99.0	227	98.7
Routers and switches installation and operations	GA	115	81.6	108	100.0	179	100.0
	PR	455	59.7	893	85.0	1032	92.9
	PU	94	66.7	192	98.0	224	97.0
Telecommunication and audio-visual devices	GA	111	78.7	106	98.1	177	98.9
	PR	362	47.5	760	72.4	1074	96.7
	PU	90	63.8	183	93.4	226	98.3
Practical NET	GA	141	100.0	108	100.0	179	100.0
	PR	752	98.7	1048	99.8	1109	99.8
	PU	141	100.0	196	100.0	231	100.0

Table 169 shows pass rates for all schools and all subjects have been quite high, with the majority of schools achieving a pass rate of 80% or higher in each subject. However, there are some variations in pass rates between the different schools and trades. In the trade “Install and configure wireless network,” all schools have consistently achieved high pass rates, with GA achieving a pass rate of 100% in 2019 and 2021, and PR achieving a pass rate of 93.8% in 2022 and PU achieving 97.0% in the same year. In “LAN setup and network maintenance subjects,” GA and PU have consistently achieved high pass rates of 99.4% and above, while PR had a lower pass rate of 80% in 2021. For “Network and system administration,” all schools have consistently achieved high pass rates, with GA achieving the highest pass rate of 99.4% in 2022.

In “Routers and switches installation and operations,” there is a notable variation in pass rates between schools. GA had a pass rate of 81.6% in 2019, while PR and PU had pass rates of 59.7% and 66.7%, respectively, in the same year. However, in 2021 and 2022, all schools achieved pass rates of 85% to 100%.

In “Telecommunication and audio-visual devices, subject” PR had a significantly lower pass rate of 47.5% in 2019, while GA and PU had pass rates of 78.7% and 63.8%, respectively. However, in 2021 and 2022, all schools achieved pass rates of 72.4% or higher`

In “Practical NET,” all schools consistently achieved high pass rates of 98.7% or higher, with PU and GA achieving a pass rate of 100% in all years. Overall, it seems that schools owned by GA and PU have consistently achieved high pass rates across all subjects and years, while schools owned by PR have shown more variation in pass rates.

3.5.25 Office Management (OFM) Trade

Students’ performance and pass rate in OFM trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in OFM.

Table 170: Number of students who attended the trade of Office Management (OFM)

Subjects	2019	2021	2022
Business English communication	22	14	36
Computer skills	22	14	36
Dealing with colleagues and customers services	22	14	36
Managing organization office and archives	22	14	36
Operating office equipment	22	14	36
Practical OFM	22	14	36

Table 170 represents the total number of students who sat for the Office Management (OFM) National Exams across the three academic years: 2019, 2021, and 2022. The exams covered six different subjects related to office management, and the table shows the number of students who sat for the exams for each subject in the three years. From the table, it is noted that the total number of students who sat for the exams remained the same for all the six subjects in each of the three academic years. Each subject had 22 students who sat for the exam in 2019, and that number decreased to 14 students in 2021 before increasing back to 36 students in 2022. This data could indicate various factors that may have influenced the attendance of students. There seems to be a trend of an increase in the number of students sitting for the OFM trade, with the total number of students increasing from 132 in 2019 to 216 in 2022. This increase may indicate a growing demand for skills related to office management, possibly due to changes in the workforce and the increasing importance of administrative roles in various industries.

Table 171: Pass rate trend in Office Management (OFM) Core subjects

OFM	2019		2021		2022	
	No.	%	No.	%	No.	%
Business English communication	9	40.9	14	100.0	36	100.0
Computer skills A	22	100.0	14	100.0	32	88.9
Dealing with colleagues and customers services	5	22.7	14	100.0	34	94.4
Managing organization office and archives	16	72.7	14	100.0	32	88.9
Operating office equipment	8	36.4	13	92.9	33	91.7
Practical OFM	22	100.0	14	100.0	36	100.0

Based on the given data in table 171, the general pass rate trend in OFM trade per subject for the years 2019, 2021, and 2022 can be analysed. Business English Communication: There is a significant improvement in the pass frequency from 2019 to 2021 and 2022, with 40.9% in 2019 to 100% in both 2021 and 2022. Computer Skills A: There is a consistent pass frequency of 100% in 2019, 2021, and a slight decrease to 88.9% in 2022.

Dealing with Colleagues and Customer Services: There is a substantial improvement in the pass frequency from 2019 to 2021 and 2022, with 22.7% in 2019 to 100% in 2021 and a slight decrease with 94.4 in 2022. Managing Organization Office and Archives: There is a consistent pass frequency of 72.7% in 2019, 100% in 2021, and a slight decrease to 88.9% in 2022. Operating Office Equipment: There is an improvement in the pass frequency from 2019 to 2021 and 2022, with 36.4% in 2019 to 92.9% in 2021 and 91.7% in 2022. Practical OFM: There is a consistent

pass frequency of 100% in 2019, 2021, and 2022. In summary, there is an overall improvement in the pass frequency across all subjects from 2019 to 2021 and 2022.

Table 172: Pass rate in Office management by Gender

OFM		2019		2021		2022	
		No.	%	No.	%	No.	%
Business english communication	Female	7	41.2	12	100.0	28	100.0
	Male	2	40.0	2	100.0	8	100.0
Computer skills A	Female	17	100.0	12	100.0	24	85.7
	Male	5	100.0	2	100.0	8	100.0
Dealing with colleagues and customers services	Female	3	17.6	12	100.0	26	92.9
	Male	2	40.0	2	100.0	8	100.0
Managing organization office and archives	Female	12	70.6	12	100.0	24	85.7
	Male	4	80.0	2	100.0	8	100.0
Operating office equipment	Female	7	41.2	12	100.0	26	92.9
	Male	1	20.0	1	50.0	7	87.5
Practical OFM	Female	17	100.0	12	100.0	28	100.0
	Male	5	100.0	2	100.0	8	100.0

Table 172, presents the general performance trend in OFM trade basing on gender for the years 2019, 2021, and 2022. In Business English Communication, in 2019, only 7 females and 2 males sat for the subject, with a pass percentage of 41.2% and 40.0%, respectively. In 2021, all females and males passed with a 100% pass rate. In 2022, again all females and males passed with a 100% pass rate. For Computer Skills A, all females and males who sat for the subject in all three years passed, with a pass rate of 100% for all years, except for females in 2022, where the pass rate was 85.7%. For “Dealing with Colleagues and Customers Services”, in 2019, only 3 females and 2 who did exam for this subject, had a pass rate of 17.6% and 40.0%, respectively. In 2021 all females and males had a pass rate of 100% and in 2022 males maintained the pass rate of 100% while females had a slight decrease with 92.6%. For Managing Organization Office and Archives, in 2019, 12 females and 4 males took the trade, with a pass rate of 70.6% and 80.0%, respectively. In 2021 and 2022, all females and males passed, with a pass rate of 100% both years, except for females in 2022, where the pass rate was 85.7%. For Operating Office Equipment, in 2019, only 7 females and 1 male sat for exam, with a pass rate of 41.2% and 20.0%, respectively. In 2021 female scored 100% while male had 50% and in 2022, all females and males who did exams passed with 50.0% and 87.5% f respectively. For Practical OFM, all females and males who sat for exams in all three years passed, with a pass rate of 100% for all years

Overall, it can be concluded that there is a general trend of improvement in pass rates for all trades and genders from 2019 to 2021 and 2022. However, there are still some fluctuations in pass rate in different subjects among females and males.

Table 173: Average score, SD & VC of scores in OFM

OFM		2019	2021	2022
Business English communication	Mean	33.0	79.4	62.9
	SD	12.3	14.6	17.3
	VC	37.2	18.5	27.5
Computer skills A	Mean	62.3	87.9	40.3
	SD	9.4	6.5	17.5
	VC	15.1	7.3	43.5
Dealing with colleagues and customers services	Mean	29.6	78.7	51.0
	SD	13.9	8.5	20.7
	VC	47.1	10.7	40.6
Managing organization office and archives	Mean	47.5	93.7	34.5
	SD	19.9	10.7	21.9
	VC	41.8	11.4	63.4
Operating office equipment	Mean	36.6	85.4	44.9
	SD	12.0	15.7	21.9
	VC	32.8	18.4	48.7
Practical OFM	Mean	92.9	97.2	90.7
	SD	3.3	1.8	3.5
	VC	3.5	1.9	3.9

Table 173 shows the performance trend by using mean, standard deviation (SD), and coefficient of variation (VC) in OFM trade for the given years. In Business English Communication; the mean score for 2019 was 33.0, which increased to 79.4 in 2021 and then decreased to 62.9 in 2022. The standard deviation increased over the years, indicating more variability in the scores. The coefficient of variation was highest in 2019 at 37.2%, indicating high variability in the scores. Computer Skills A: The mean score for 2019 was 62.3, which increased to 87.9 in 2021 and then decreased to 40.3 in 2022. The standard deviation decreased over the years except 2022, indicating less variability in the scores. The coefficient of variation was lowest in 2021 at 7.3%, indicating low variability in the scores.

Dealing with Colleagues and Customer Services: The mean score for 2019 was 29.6, which increased to 78.7 in 2021 and then decreased to 51.0 in 2022. The standard deviation increased over the years, except in 2021 indicating more variability in

the scores. The coefficient of variation was highest in 2019 at 47.1%, indicating high variability in the scores. Managing Organization Office and Archives: The mean score for 2019 was 47.5, which increased to 93.7 in 2021 and then decreased to 34.5 in 2022. The standard deviation increased over the years, except 2021 indicating more variability in the scores. The coefficient of variation was highest in 2022 at 63.4%, indicating high variability in the scores. Operating Office Equipment: The mean score for 2019 was 36.6, which increased to 85.4 in 2021 and then decreased to 44.9 in 2022. The standard deviation increased over the years, indicating more variability in the scores. The coefficient of variation was highest in 2022 at 48.7%, indicating high variability in the scores. Practical OFM: The mean score for 2019 was 92.9, which increased to 97.2 in 2021 and then decreased to 90.7 in 2022. The standard deviation increased slightly over the years except 2021, indicating more variability in the scores. The coefficient of variation was lowest in 2021 at 1.9%, indicating low variability in the scores.

In general, there was a variation in mean scores, SD and VC across all the years meaning there was fluctuation of performance trend in different subjects in years.

Table 174: Pass rate in OFM trade by school ownership

OFM		2019		2021		2022	
		No.	%	No.	%	No.	%
Business English communication	PU	7	46.7	13	100.0	11	100.0
Computer skills A	PU	15	100.0	13	100.0	11	100.0
Dealing with colleagues and customers services	PU	3	20.0	13	100.0	11	100.0
Managing organization office and archives	PU	12	80.0	13	100.0	11	100.0
Operating office equipment	PU	7	46.7	13	100.0	11	100.0
Practical OFM	PU	15	100.0	13	100.0	11	100.0

Table 174 shows the pass rates (%) for six subjects offered by a school over three academic years, broken down by school ownership (PU). Here is a breakdown of the analysis: Across all subjects, there is a clear trend of improved pass rates from 2019 to 2021, and further improvement to 2022. In 2019, there were some subjects where the pass rates for students were lower than 50% (i.e., Business English communication and Operating office equipment). However, in 2021 and 2022, all subjects had a 100% pass rate. This indicates that the school has made significant improvements in these subjects over the past two years. There are some subjects where the pass rates were already at 100% in 2019 (i.e., Computer skills A and Practical OFM). However, the fact that these pass rates remained at 100% in 2021 and 2022 suggests that the school has been able to maintain its high standards in these subjects.

Dealing with colleagues and customers services had a low pass rate with 20% and Managing organization office and archives had relatively high pass rates with 80% in 2019. However, in 2021 and 2022, the pass rates for these subjects increased to 100%. This is a positive indication that the school has been able to improve performance in these subjects as well. In general, it can be observed that Office Management is offered by public schools only.

3.5.26 Plumbing (PLB) Trade

Students' performance and pass rate in PLB trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in PLB.

Table 175: Number of students who sat for the Plumbing (PLB) trade

Subjects	2019	2021	2022
Cold and hot water system installation	99	171	172
Cost estimation and topography	99	171	172
Drainage system installation	99	171	172
Fluid knowledge, water catchment and treatment	99	171	172
Pipe work drawing and DCG	99	171	172
Practical PLB	99	171	172

Table 175 presents the number of students who sat for the National Exams in the trade of Plumbing (PLB) across the three years: 2019, 2021, and 2022. The table is broken down into six different subjects. Across all the six subjects, there were 99 students who sat for the PLB National Exams in 2019. In the 2021 academic year, the number of students who sat for the exams increased to 171 for all the six subjects. Finally, in the 2022 academic year, the number of students who sat for the exams remained at 172 for all the six subjects. Overall, it seems that there has been an increase in the number of students offering the PLB National Exams over the past three years, with a significant jump from 2019 to 2021. It's also notable that the number of students attending the exams remained steady from 2021 to 2022, suggesting that the increase in attendance has leveled off.

Table 176: Pass rate trend in Plumbing trade in Core subjects

PLB	2019		2021		2022	
	No.	%	No.	%	No.	%
Cold and hot water system installation	91	91.9	150	87.7	171	99.4
Cost estimation and topography	91	91.9	149	87.1	165	95.9
Drainage system installation	96	97.0	166	97.1	172	100.0
Fluid knowledge, water catchment and treatment	95	96.0	153	89.5	169	98.3
Pipe work drawing and DCG	97	98.0	163	95.3	172	100.0
Practical PLB	98	99.0	171	100.0	172	100.0

Table 176 shows the pass rates of different plumbing trade subjects in three different years, 2019, 2021, and 2022. Overall, the pass rates for all subjects have remained consistently high, with the majority of subjects achieving pass rates above 90%. Looking at the individual subjects, the pass rate for Cold and hot water system installation decreased slightly from 91.9% in 2019 to 87.7% in 2021, but then increased significantly to 99.4% in 2022. Cost estimation and topography also showed a slight decrease from 91.9% in 2019 to 87.1% in 2021, but then increased to 95.9% in 2022. The Drainage system installation subject maintained a high pass rate of 97.0% in 2019 and 97.1% in 2021, and achieved a perfect pass rate of 100.0% in 2022. Fluid knowledge, water catchment and treatment also showed a slight decrease from 96.0% in 2019 to 89.5% in 2021, but then increased to 98.3% in 2022. Pipe work drawing and DCG achieved a high pass rate of 98.0% in 2019, but then decreased slightly to 95.3% in 2021 before achieving a perfect pass rate of 100.0% in 2022. Finally, Practical PLB achieved a near-perfect pass rate of 99.0% in 2019 and a perfect pass rate of 100.0% in both 2021 and 2022.

Overall, the pass rates in the plumbing trade subjects have remained consistently high, with some slight fluctuations in certain subjects from year to year. However, the majority of subjects achieved pass rates above 90% in all three years analyzed.

Table 177: Pass rate in Plumbing trade by Gender

PLB		2019		2021		2022	
		No.	%	No.	%	No.	%
Cold and hot water system installation	Female	22	84.6	41	93.2	57	98.3
	Male	69	94.5	113	83.1	114	100.0
Cost estimation and topography	Female	23	88.5	41	93.2	56	96.6
	Male	68	93.2	113	83.1	109	95.6
Drainage system installation	Female	24	92.3	44	100.0	58	100.0
	Male	72	98.6	130	95.6	114	100.0
Fluid knowledge, water catchment and treatment	Female	23	88.5	41	93.2	58	100.0
	Male	72	98.6	116	85.3	111	97.4
Pipe work drawing and DCG	Female	25	96.2	42	95.5	58	100.0
	Male	72	98.6	129	94.9	114	100.0
Practical PLB	Female	26	100.0	44	100.0	58	100.0
	Male	72	98.6	136	100.0	114	100.0

Table 177 presents the pass rate percentage by gender in the trade of plumbing in different years, including 2019, 2021, and 2022, for six different subjects. Overall, the pass rate percentage for both genders has been consistently high throughout the years, with some variations between subjects. In the subject of Cold and Hot Water System Installation, the pass rate percentage for females has increased from 84.6% in 2019 to 98.3% in 2022, while for males, it has remained consistently high at 94.5%, 83.1%, and 100% for the respective years. Similarly, in the subject of Cost Estimation and Topography, the pass rate percentage for females has increased from 88.5% in 2019 to 96.6% in 2022, while for males, it has remained consistently high at 93.2%, 83.1%, and 95.6% for the respective years. In Drainage System Installation, both females and males have consistently high pass rates, with females achieving a perfect 100% pass rate in both years 2021 and 2022. In Fluid Knowledge, Water Catchment, and Treatment, the pass rate percentage for females has remained consistently high at 88.5%, 93.2%, and 100% for the respective years, while for males, it has decreased from 98.6% in 2019 to 85.3% in 2021 and then increased to 97.4% in 2022. In Pipe Work Drawing and DCG, both females and males have consistently high pass rates, with females and male achieving a perfect 100% pass rate in 2022. Finally, in Practical PLB, both females and males have achieved a perfect 100% pass rate in all the years except male in 2019 the pass rate was 98.6%. Overall, it can be concluded that there is no significant difference in pass rate percentage between genders in the trade of plumbing, and both females and males have consistently high pass rates across all subjects.

Table 178: Average score, SD & Variation Coefficient of scores in Plumbing trade

PLB		2019	2021	2022
Cold and hot water system installation	Mean	62.7	76.8	72.6
	SD	14.4	11.5	15.6
	VC	23.0	15.0	21.5
Cost estimation and topography	Mean	62.4	77.5	57.9
	SD	15.7	16.5	20.7
	VC	25.2	21.3	35.8
Drainage system installation	Mean	85.3	89.4	84.8
	SD	11.5	10.7	13.2
	VC	13.5	11.9	15.5
Fluid knowledge, water catchment and treatment	Mean	69.8	67.3	61.2
	SD	12.9	14.8	18.3
	VC	18.5	21.9	29.9
Pipe work drawing and DCG	Mean	87.5	84.2	72.0
	SD	12.3	12.0	16.4
	VC	14.0	14.2	22.7
Practical PLB	Mean	94.5	94.3	93.8
	SD	4.6	4.2	4.4
	VC	4.9	4.4	4.7

Table 178 shows the Mean, standard deviation, and variation coefficient (VC). It can be observed that the mean values of the different trades of plumbing vary across the years. For example, the mean value for Cold and hot water system installation was highest in 2021 (76.8) and lowest in 2019 (62.7), whereas the mean value for Fluid knowledge, water catchment, and treatment was highest in 2019 (69.8) and lowest in 2022 (61.2). The standard deviation values also vary across the years for the different subjects of plumbing. For example, the standard deviation value for Cost estimation and topography was highest in 2022 (20.7) and lowest in 2019 (15.7), whereas the standard deviation value for Drainage system installation was highest in 2022 (13.2) and lowest in 2021 (10.7). The variation coefficient values also vary across the years for the different subjects of plumbing. For example, the coefficient of variation value for Cost estimation and topography was highest in 2022 (35.8%) and lowest in 2021 (21.3%), whereas the variation coefficient value for Drainage system installation was highest in 2022 (15.5%) and lowest in 2021 (11.9%). Overall, we can see that the variability in the different subjects of plumbing varies across the years, with some trades showing more variability than others.

Understanding the variability of data can help in making informed decisions about the trade of plumbing and in identifying subjects where improvements can be made.

Table 179: Pass rate in Plumbing trade by school ownership

PLB		2019		2021		2022	
		No.	%	No.	%	No.	%
Cold and hot water system installation	GA	41	93.2	63	94.0	27	100.0
	PR			5	100.0	26	96.3
	PU	49	90.7	76	91.6	98	100.0
Cost estimation and topography	GA	42	95.5	63	94.0	27	100.0
	PR			3	60.0	23	85.2
	PU	48	88.9	75	90.4	97	99.0
Drainage system installation	GA	42	95.5	67	100.0	27	100.0
	PR			5	100.0	27	100.0
	PU	53	98.1	82	98.8	98	100.0
Fluid knowledge, water catchment and treatment	GA	42	95.5	64	95.5	27	100.0
	PR			5	100.0	27	100.0
	PU	52	96.3	77	92.8	97	99.0
Pipe work drawing and DCG	GA	43	97.7	65	97.0	27	100.0
	PR			5	100.0	27	100.0
	PU	53	98.1	81	97.6	98	100.0
Practical PLB	GA	44	100.0	67	100.0	27	100.0
	PR			5	100.0	27	100.0
	PU	53	98.1	83	100.0	98	100.0

Generally, the pass rates are high for all subjects in all different forms of school ownerships, with most of them being above 90% and many at or close to 100%. This indicates that the candidates are generally well-prepared and competent in the plumbing trade. In the “Cold and hot water system installation” subject, the pass rates are consistently high across all ownership types and years, with all of them being above 90% and many at or close to 100%.

In the “Cost estimation and topography” subject, the pass rates are also generally high, but there are some lower percentages in the PR ownership type (60.0%) for the year 2021, which could indicate some issues with the training or testing methods in that group. In the “Drainage system installation” subject, the pass rates are consistently high across all ownership types and years, with all of

them being at or close to 100%. In the “Fluid knowledge, water catchment and treatment” subject, the pass rates are generally high, but there is a small drop in the PU ownership type for the year 2019 to 2022 it dropped from 96.3% to 92.8%, which could indicate some issues with the training or testing methods in that group. In the “Pipe work drawing and DCG” subject, the pass rates are consistently high across all ownership types and years, with all of them being at or close to 100%. In the “Practical PLB” subject, the pass rates are consistently high across all ownership types and years, with all of them being at or close to 100%. Overall, the pass rates for all subjects and ownership types are high, indicating a high level of competency among the candidates in the plumbing trade. However, there are some variations across ownership types and years, which could indicate some issues with the training or testing methods in certain groups. It may be beneficial to investigate these variations further to ensure that all candidates are being trained and tested fairly and effectively.

3.5.27 Road Construction (RCT) trade

Students’ performance and pass rate in RCT trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in RCT.

Table 180: Students registered in the trade of Road Construction (RCT)

Subjects	2019	2021	2022
Bridge construction technology	221	301	196
Construction materials testing	221	301	196
Cost estimation and site management	221	301	196
Practical RCT	221	301	196
Road construction and maintenance	221	301	196
Technical drawing	221	301	196

Table 180 shows the number of students who sat for the National Exams in the trade of Road Construction (RCT) across the three academic years: 2019, 2021, and 2022. The exams covered six subjects. In 2019, the number of students who attended the National Exams in each subject was 221. In 2021, there was an increase in attendance, with 301 students attending the exams in each subject. However, in 2022, the number of attendees dropped back to 196, which is lower than the number of students who attended in 2019.

Overall, there was an increase in the enrollment of students in the second year (2021) compared to the first year (2019), but a decrease in enrollment in the third year (2022). This pattern of enrollment could be attributed to several factors, including changes in the demand for skilled workers in the RCT trade, changes in the availability of educational resources for students interested in the trade.

Table 181: Pass rate trend in RCT (trade) in Core subjects

RCT	2019		2021		2022	
	No.	%	No.	%	No.	%
Bridge construction technology	220	99.5	297	98.7	196	100
Construction materials testing	201	91.0	295	98.0	196	100
Cost estimation and site management	204	92.3	274	91.0	196	100
Road construction and maintenance	220	99.5	293	97.3	196	100
Technical drawing	220	99.5	288	95.7	196	100
Practical RCT	220	99.5	301	100.0	196	100

Table 181 presents the performance trends in different core subjects of RCT (trade) over three years: 2019, 2021, and 2022. The percentage scores of each subject in the three years are presented. The trends in the table show that overall, the performance of students in RCT (trade) has improved significantly over the three years, as most subjects achieved 100% in the last year. Bridge construction technology and technical drawing had consistently high-performance levels of 99.5% in 2019 and remained high in 2021 and 2022. Construction materials testing and Cost estimation and site management had lower scores in 2019, but both showed significant improvements in 2021 and reached 100% in 2022. Similarly, Road construction and maintenance had a slight decrease in 2021 but regained 100% in 2022. Lastly, Practical RCT had a high-performance level of 99.5% in 2019 and achieved a perfect score of 100% in 2021 and 2022. Overall, the table demonstrates a positive trend in the performance of students in RCT (trade) across all subjects, with most subjects achieving perfect scores in the last years.

Table 182: Pass rate in RCT Trade by Gender

RCT		2019		2021		2022	
		No.	%	No.	%	No.	%
Bridge construction technology	Female	86	100.0	96	98	64	100
	Male	134	99.3	201	99	132	100
Construction materials testing	Female	86	100.0	95	96.9	64	100
	Male	134	99.3	200	98.5	132	100
Cost estimation and site management	Female	77	89.5	89	90.8	64	100
	Male	127	94.1	185	91.1	132	100
Road construction and maintenance	Female	74	86.0	94	95.9	64	100
	Male	127	94.1	199	98	132	100
Technical drawing	Female	86	100.0	93	94.9	64	100
	Male	134	99.3	195	96.1	132	100
Practical RCT	Female	86	100.0	98	100	64	100
	Male	134	99.3	203	100	132	100

Table 182 indicates the performance by gender and by subject in the years 2019, 2021, and 2022. Looking at the data given in the table above, the following can be observed: Bridge Construction Technology: For females, the pass rate was 100% in 2019, 98% in 2021, and 100% in 2022. For males, the pass rate was 99.3% in 2019 and 2021, and 100% in 2022. Construction Materials Testing: For females, the pass rate was 100% in 2019, 96.9% in 2021, and 100% in 2022. For males, the pass rate was 99.3% in 2019, 98.5% in 2021, and 100% in 2022.

Cost Estimation and Site Management: For females, the pass rate was 89.5% in 2019, 90.8% in 2021, and 100% in 2022. For males, the pass rate was 94.1% in 2019, 91.1% in 2021, and 100% in 2022. Road Construction and Maintenance: For females, the pass rate was 86.0% in 2019, 95.9% in 2021, and 100% in 2022. For males, the pass rate was 94.1% in 2019, 98% in 2021, and 100% in 2022.

Technical Drawing: For females, the pass rate was 100% in 2019, 94.9% in 2021, and 100% in 2022. For males, the pass rate was 99.3% in 2019, 96.1% in 2021, and 100% in 2022. Practical RCT: For females, the pass rate was 100% in 2019, 100% in 2021, and 100% in 2022. For males, the pass rate was 99.3% in 2019, 100% in 2021, and 100% in 2022. Overall, we can see that the pass rates were consistently high across all subjects and gender in the three years (2019, 2021 and 2022) analyzed. In most subjects, the pass rates increased or remained the same over time, indicating that the students were performing well and improving in their understanding of the subjects.

Table 183: Average score, SD & VC of scores in RCT trade

RCT		2019	2021	2022
Bridge construction technology	Mean	80.8	84.6	86.6
	SD	10.9	7.9	9.7
	VC	13.5	9.4	11.2
Construction materials testing	Mean	79.5	88.9	80.0
	SD	10.3	8.8	10.9
	VC	12.9	9.8	13.7
Cost estimation and site management	Mean	63.0	80.5	78.6
	SD	14.9	11.3	11.9
	VC	23.7	14.0	15.1
Road construction and maintenance	Mean	59.3	83.8	80.9
	SD	12.9	10.0	12.9
	VC	21.8	12.0	15.9
Technical drawing	Mean	77.1	86.6	80.4
	SD	11.9	9.7	13.2
	VC	15.5	11.2	16.4
Practical RCT	Mean	93.6	94.0	92.9
	SD	4.2	4.1	4.8
	VC	4.5	4.4	5.1

Table 183, indicates the mean scores, standard deviations, and coefficient of variation (CV) for subjects of Road construction (RCT) in the years 2019, 2021, and 2022. Looking at the data given, the following observations have been mentioned. For Bridge Construction Technology: The mean score for Bridge Construction Technology increased from 80.8 in 2019 to 84.6 in 2021, and further increased to 86.6 in 2022. The standard deviation also increased from 10.9 in 2019 to 9.7 in 2021, and increased again to 11.2 in 2022. The coefficient of variation (CV) decreased from 13.5 in 2019 to 9.4 in 2021, but increased to 11.2 in 2022. This indicates that the performance of students in Bridge Construction Technology has generally improved over time, but with a slightly higher degree of variability in the most recent year. Construction Materials Testing: The mean score for Construction Materials Testing increased significantly from 79.5 in 2019 to 88.9 in 2021, but then dropped to 80.0 in 2022. The standard deviation also increased from 10.3 in 2019 to 8.8 in 2021, but increased again to 10.9 in 2022. The coefficient of variation (CV) decreased from 12.9 in 2019 to 9.8 in 2021, but increased to 13.7 in 2022. This indicates that while there was a significant improvement in student performance in 2021, there was a decline in 2022, and the degree of variability in performance increased.

Cost Estimation and Site Management: The mean score for Cost Estimation and Site Management increased significantly from 63.0 in 2019 to 80.5 in 2021, but then dropped slightly to 78.6 in 2022. The standard deviation also decreased from 14.9 in 2019 to 11.3 in 2021, and decreased further to 11.9 in 2022. The coefficient of variation (CV) decreased from 23.7 in 2019 to 14.0 in 2021, but increased to 15.1 in 2022. This indicates that there was a significant improvement in student performance in 2021, but a slight decline in 2022, with a slightly higher degree of variability in performance.

Road Construction and Maintenance: The mean score for Road Construction and Maintenance increased significantly from 59.3 in 2019 to 83.8 in 2021, but then dropped slightly to 80.9 in 2022. The standard deviation increased from 12.9 in 2019 to 10.0 in 2021, and increased further to 12.9 in 2022. The coefficient of variation (CV) decreased from 21.8 in 2019 to 12.0 in 2021, but increased to 15.9 in 2022. This indicates that while there was a significant improvement in student performance in 2021, there was a decline in 2022, and the degree of variability in performance increased.

Technical Drawing: The mean score increased from 77.1 in 2019 to 86.6 in 2021, but then decreased to 80.4 in 2022. The standard deviation also increased from 11.9 in 2019 to 13.2 in 2022, while the CV increased from 15.5 in 2019 to 16.4 in 2022. This suggests that there was greater variability in scores in 2022 compared to 2019. For Practical RCT, we can see that the mean score remained relatively consistent across the years, with a high of 94.0 in 2021 and a low of 92.9 in 2022. The standard deviation and CV remained relatively low across the years, with a slight increase in 2022. This suggests that there was less variability in scores for Practical RCT compared to others subjects. Overall, the data suggests that there were fluctuations in scores and variability across the years for most of subjects, while scores for Practical RCT remained consistent.

Table 184: Pass rate in Road construction (RCT) by school ownership

RCT		2019		2021		2022	
		No.	%	No.	%	No.	%
Bridge construction technology	GA	110	99.1	175	98.9	94	100
	PR	25	100.0	NA	NA	25	100
	PU	85	100.0	122	98.4	77	100
Construction materials testing	GA	100	90.1	174	98.3	94	100
	PR	23	92.0	NA	NA	25	100
	PU	78	91.8	121	97.6	77	100
Cost estimation and site management	GA	109	98.2	165	93.2	94	100
	PR	22	88.0	NA	NA	25	100
	PU	73	85.9	109	87.9	77	100
Practical RCT	GA	110	99.1	177	100.0	94	100
	PR	25	100.0	NA	NA	25	100
	PU	85	100.0	124	100.0	77	100
Road construction and maintenance	GA	110	99.1	174	98.3	94	100
	PR	25	100.0	NA	NA	25	100
	PU	85	100.0	119	96.0	77	100
Technical drawing	GA	110	99.1	169	95.5	94	100
	PR	25	100.0	NA	NA	25	100
	PU	85	100.0	119	96.0	77	100

The table 184, indicates the pass rates according to the type of school ownership (GA, PR, and PU) by subject over the years 2019, 2021, and 2022 in Road construction (RCT). Based on the data given in the table above, the following is a breakdown of the pass rates by subject.

For Bridge construction technology: GA schools had a pass rate of 99.1% in 2019, 98.9% in 2021, and 100% in 2022. PR schools had a pass rate of 100% in 2019 and 2022, but there is no data available for 2021. PU schools had a pass rate of 100% in 2019, 98.4% in 2021, and 100% in 2022.

For Construction materials testing: GA schools had a pass rate of 90.1% in 2019, 98.3% in 2021, and 100% in 2022. PR schools had a pass rate of 92.0% in 2019, but there is no data available for 2021. In 2022, the pass rate was 100%. PU schools had a pass rate of 91.8% in 2019, 97.6% in 2021, and 100% in 2022.

For Cost estimation and site management: GA schools had a pass rate of 98.2% in 2019, 93.2% in 2021, and 100% in 2022.

PR schools had a pass rate of 88.0% in 2019, but there is no data available for 2021. In 2022, the pass rate was 100%. PU schools had a pass rate of 85.9% in 2019, 87.9% in 2021, and 100% in 2022.

For Practical RCT: GA for had a pass rate of 99.1% in 2019, 100% in 2021, and 100% in 2022. PR had a pass rate of 100% in 2019 and 2022, but there is no data available for 2021. PU had a pass rate of 100% in 2019, 100% in 2021, and 100% in 2022.

For Road construction and maintenance: GA schools had a pass rate of 99.1% in 2019, 98.3% in 2021, and 100% in 2022. PR schools had a pass rate of 100% in 2019 and 2022, but there is no data available for 2021. PU schools had a pass rate of 100% in 2019, 96.0% in 2021, and 100% in 2022. For Technical drawing: GA schools had a pass rate of 99.1% in 2019, 95.5% in 2021, and 100% in 2022. PR schools had a pass rate of 100% in 2019 and 2022, but there is no data available for 2021. PU schools had a pass rate of 100% in 2019 and decreased to 96.0% in 2020/20021 and further increased to 100%. Overall, the data suggests that students across all school ownership types performed well in these technical subjects, with pass rates consistently at or above 90%.

3.5.28 Ceramic & Sculpture (SCE) trade

Students' performance and pass rate in SCE trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in SCE.

Table 185: Number of students who sat for the trade of SCE

Subjects	2019	2021	2022
Ceramic technology	24	21	27
Computer skills B	24	21	27
History of art and aesthetics	24	21	27
Practical SCE	24	21	27
Sketch	24	21	27
Technical drawing and design	24	21	27

Table 185 shows the total number of students who sat for the National Exams in the trade of Sculpture and Ceramics (SCE) across the three academic years: 2019, 2021, and 2022. The subjects that were tested in the exam were Ceramic technology, Computer skills B, History of art and aesthetics, Practical SCE, Sketch, and technical drawing and design. It is clear from the table that the number of students who sat for the SCE National Exams remained consistent in each year over the three-year period, with 24 students sitting each of the six subjects in 2019 and 21 students attending each of the six subjects in 2021 and 27 in 2022. This indicates that there was change in the overall popularity of the SCE trade or in

the number of students interested in pursuing a career in sculpture and ceramics during this period. However, it should be noted that there was a slight increase in the number of students attending each subject in the 2022 academic year, with 27 students attending each subject compared to 21 students in the previous academic year. This could indicate a growing interest in the SCE trade or a higher demand for skilled professionals in this field.

Table 186: Pass rate trend in SCE trade Core subjects

SCE	2019		2021		2022	
	No.	%	No.	%	No.	%
Ceramic technology	24	100	21	100.0	27	100
Computer skills B	24	100	20	95.2	27	100
History of Art and Aesthetics	24	100	21	100.0	27	100
Sketch	24	100	20	95.2	27	100
Technical drawing and design	24	100	19	90.5	27	100
Practical SCE	24	100	21	100.0	27	100

As indicated in table 186, the overall performance of students in the ceramic & sculpture trade in the National examinations appears to be consistently high, with many of the students achieving perfect scores. In Ceramic Technology, History of Art and Aesthetics, Practical Ceramics & Sculpture, and Sketch, the students achieved perfect scores in all three years, indicating a strong understanding of the subject matter and consistent performance. In Computer Skills B, the students achieved perfect scores in 2019 and 2022, with a slightly lower score of 95.2% in 2021. This may be due to various factors such as changes in the exam format or difficulty level, or a different group of students taking the exam. In Sketch, the students achieved perfect scores in 2019 and 2022, with a slightly lower score of 95.2% in 2021. This may be due to various factors such as changes in the exam format or difficulty level, or a different group of students taking the exam. In Technical Drawing & Design, the students achieved a perfect score in 2019 and 2022, but their scores dropped to 90.5% in 2021. This drop-in score subjects may be due to changes in the exam format or difficulty level, or other factors that could have affected the performance of the students.

Overall, these consistently high scores suggest that the students have a strong grasp of the subject matter and have been well-prepared for the National examinations. However, as with any exam results, it is important to consider other factors that could influence performance, such as the quality of teaching and resources available to the students.

Table 187: Pass rate in Ceramic & Sculpture by Gender

SCE		2019		2021		2022	
		No.	%	No.	%	No.	%
Ceramic technology	Female	2	100	6	100	5	100
	Male	22	100	15	100	22	100
Computer skills B	Female	2	100	5	83.3	5	100
	Male	22	100	15	100	22	100
History of art and Aesthetics	Female	2	100	6	100	5	100
	Male	22	100	15	100	22	100
Sketch	Female	2	100	5	83.3	5	100
	Male	22	100	15	100	22	100
Technical drawing and design	Female	2	100	4	66.7	5	100
	Male	22	100	15	100	22	100
Practical SCE	Female	2	100	6	100	5	100
	Male	22	100	15	100	22	100

Table 187 shows the overall, performance of both females and males in the National examinations in these subjects appears to be consistently high, with both genders achieving perfect scores in many cases. In Ceramic Technology, Computer Skills B, History of Art and Aesthetics, Practical Ceramic & Sculpture, and Sketch, both females and males achieved perfect scores in all three years, indicating a strong understanding of the subject matter and consistent performance.

In Sketch, there were some differences in performance between females and males. While both genders performed well in 2019 and 2022, females scored slightly lower in 2021 with 83.3% compared to the males who scored 100%. In Technical Drawing & Design, there were some differences in performance between females and males. While both genders achieved perfect scores in 2019 and 2022, females scored lower in 2021 (66.7%) compared to males who scored 100%. Overall, these results suggest that both females and males have a strong grasp of the subject matter and have been well-prepared for the National examinations. However, as with any exam results, it is important to consider other factors that could influence performance, such as the quality of teaching and resources available to the students, as well as any potential biases or disparities in access to education based on gender.

Table 188: Average score, SD & CV of scores in Ceramic & Sculpture trade

SCE		2019	2021	2022
Ceramic technology	Mean	73.75	76.24	72.48
	SD	9.66	9.69	10.51
	VC	13.09	12.72	14.5
Computer skills B	Mean	69.04	70.52	73.96
	SD	14.38	13.27	9.85
	VC	20.83	18.81	13.31
History of Art and Aesthetics	Mean	76.25	80.86	72.77
	SD	9.91	11.04	11.45
	VC	13.00	13.66	15.74
Sketch	Mean	71.17	59.48	77.25
	SD	9.14	11.44	8.85
	VC	12.85	19.23	11.45
Technical drawing and design	Mean	53.21	59.67	63.96
	SD	13.06	12.73	13.22
	VC	24.55	21.33	20.67
Practical SCE	Mean	93.38	88.19	89.1
	SD	3.73	6.14	4.15
	VC	3.99	6.96	4.6

According to the given data in Table 189 on the Ceramic & sculpture trade, it can be seen that in the Ceramic technology subject, the VC in 2019 was 13.09, which decreased to 12.72 in 2021, but increased to 14.5 in 2022. This suggests that there was some increase in variability in 2022 as compared to the previous year. In Computer Skills b, the VC decreased from 20.83 in 2019 to 18.81 in 2021 and further decreased to 13.31 in 2022. This shows a decreasing trend in variability over the years. In the History of art and aesthetics, the VC remained relatively stable with a slight increase from 13.00 in 2019 to 13.66 in 2021 and a larger increase to 15.74 in 2022.

In Sketch, the VC decreased from 12.85 in 2019 to 11.45 in 2022, but it was much higher in 2021 at 19.23, indicating higher variability in that year. In the Technical drawing & design, the VC was the highest among all the trades, with 24.55 in 2019, which decreased to 21.33 in 2021 and further decreased to 20.67 in 2022. While there was a decreasing trend over the years, the variability is still relatively high compared to other trades.

In Practical Ceramic & Sculpture trade, the VC was the lowest among all subjects, with 3.99 in 2019, which increased slightly to 6.96 in 2021 and decreased again to 4.6 in 2022. This suggests that there was a slight increase in variability in 2021, but overall, the variability remained low in this subject.

Table 189: Performance in Ceramic & Sculpture trade by school ownership

SCE		2019		2021		2022	
		No.	%	No.	%	No.	%
Ceramic technology	GA	24	100	21	100.0	27	100
Computer skills B	GA	24	100	20	95.2	27	100
History of Art and Aesthetics	GA	24	100	21	100.0	27	100
Sketch	GA	24	100	20	95.2	27	100
Technical drawing and design	GA	24	100	19	90.5	27	100
Practical SCE	GA	24	100	21	100.0	27	100

Based on the information provided in table 190, it is evident that all government-aided schools have performed extremely well in the national examinations for the ceramic and sculpture trade in the given subjects. For Ceramic Technology, Computer Skills B, History of Art and Aesthetics, Sketch, and Practical Ceramic & Sculpture, government-aided schools have consistently achieved a pass rate of 100% in 2019, 2021, and 2022 exams. However, in computer skills B, Sketch, and technical drawing & design, while all government-aided schools achieved a 100% pass rate in 2019 and 2022, the pass rate dropped to 95.2%, 95.2%, and 90.5% in 2021.

3.5.29 Solar & Energy (SEN) trade

Students' performance and pass rate in SEN trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in SEN.

Table 190: Number of students who sat for the Solar Energy (SEN)

Subjects	2019	2021	2022
Basics of electricity and electrical measurement	31	15	19
Electrical schematic analysis	31	15	19
Practical SEN	31	15	19
Solar power plant design and installation	31	15	19
Solar water heating design and installation	31	15	19
Substation installation and maintenance	31	15	19

Table 190 shows the total number of students who sat for the National Exams for Solar Energy (SEN) in six different subjects across three years, from 2019 to 2022. For all six subjects, the total number of students who attended the exams decreased from 2019 to 2021, and then increased from 2021 to 2022. This suggests a decline in interest in the SEN trade or a decrease in the number of students pursuing studies in the field. Specifically, in 2019, there were 31 students who attended the exams for each subject. However, only 15 students attended in 2021 and 19 students attended in 2022. This represents a significant drop in the number of students interested in the SEN trade, particularly in the last two years.

Overall, the table indicates that there has been a decline in the number of students pursuing studies in the SEN trade in the last two years. This may have implications for the future of the industry and the availability of skilled workers in this field. It will be interesting to see whether this trend will continue or if there will be an increase in the future.

Table 191: Pass rate trend in Solar Energy trade Core subjects

SEN	2019		2021		2022	
	No.	%	No.	%	No.	%
Basics of electricity and electrical measurement	31	100	13	86.7	19	100
Electrical schematic analysis	31	100	14	93.3	19	100
Solar power plant design and installation	31	100	13	86.7	19	100
Solar water heating design and installation	31	100	14	93.3	19	100
Substation installation and maintenance	31	100	12	80.0	19	100
Practical SEN	31	100	15	100.0	19	100

Based on the information provided in table 192, there have been some fluctuations in the performance of students in the trade of solar energy, specifically in the subjects of Basics of Electricity and Electrical Measurement, Electrical Schematic Analysis, Solar Power Plant Design and Installation, Solar Water Heating Design and Installation, Substation Installation and Maintenance, and Practical SEN. In Basics of Electricity and Electrical Measurement, while students achieved a perfect score of 100% in 2019, the pass rate dropped to 86.7% in 2021 before returning to 100% in 2022. Similarly, in Electrical Schematic Analysis, while students achieved a perfect score of 100% in 2019 and 2022, the pass rate dropped to 93.3% in 2021 before improving in 2022. In the case of Solar Power Plant Design and Installation, Solar Water Heating Design and Installation, and Substation Installation and Maintenance, there was a similar pattern of fluctuation in the pass rates in 2021.

However, in Practical Solar Energy, students achieved a perfect score of 100% in all the three years (2019, 2021&2022). Overall, the data indicates that there have been some fluctuations in the performance of students in the ceramic and sculpture trade subjects. While there have been some drops in performance in certain areas, the overall pass rates have remained high. It's important to analyze the reasons behind these fluctuations and work towards improving the performance of students in the areas where they are struggling.

Table 192: Pass rate in Solar Energy Trade by Gender

SEN		2019		2021		2022	
		No.	%	No.	%	No.	%
Basics of electricity and electrical measurement	Female	22	100	4	80		
	Male	9	100	9	90	19	100
Electrical schematic analysis	Female	22	100	5	100		
	Male	9	100	9	90	19	100
Solar power plant design and installation	Female	22	100	4	80		
	Male	9	100	9	90	19	100
Solar water heating design and installation	Female	22	100	5	100		
	Male	9	100	9	90	19	100
Substation installation and maintenance	Female	22	100	4	80		
	Male	9	100	8	80	19	100
Practical SEN	Female	22	100	5	100		
	Male	9	100	10	100	19	100

From the data presented in Table 192, it is clear that both males and females have performed well in the solar energy trade in the national examinations over the years. In the Basics of Electricity and electrical measurement subject, both genders performed equally well in 2019. However, in 2021, there was a drop in the percentage score for females to 80%, while males scored 90%. In 2022, males achieved a perfect score of 100%.

For Electrical Schematic analysis, females and males performed equally well in 2019. However, in 2021, there was a slight drop in the percentage score for males to 90%, while females maintained their perfect score. In 2022, males achieved a perfect score of 100%. In Solar power plant design and installation, females and males achieved a perfect score of 100% in 2019. In 2021, there was a drop in the percentage score for both genders, with females scoring 80% and males scoring 90%. In 2022, males achieved a perfect score of 100%. In Solar water heating design and installation, females and males achieved a perfect score of 100% in 2019. In 2021, males dropped to 90%, while females maintained their perfect score.

In 2022, males achieved a perfect score of 100%. In Substation installation and maintenance, both genders achieved a perfect score of 100% in 2019. In 2021, there was a drop in the percentage score for both genders, with females and males scoring 80%. In 2022, males achieved a perfect score of 100%. Finally, in Practical Solar energy, both genders achieved a perfect score of 100% in 2019, 2021, and 2022 males scored 100%

Overall, the data shows that both males and females have performed well in the solar energy trade in the national examinations over the years. While there were drops in percentage scores in some subjects, both genders have consistently achieved a high level of proficiency in the solar energy trade.

Table 193: Average score, SD & CV scores in Solar Energy trade

SEN		2019	2021	2022
Basics of electricity and electrical measurement	Mean	86.71	45.80	66.4
	SD	8.46	18.92	17.5
	VC	9.75	41.31	26.3
Electrical schematic analysis	Mean	77.10	62.60	68.1
	SD	9.13	21.06	10.9
	VC	11.84	33.64	16.0
Solar power plant design and installation	Mean	87.77	61.40	80.8
	SD	6.14	19.50	10.1
	VC	7.00	31.75	12.6
Solar water heating design and installation	Mean	80.42	69.67	71.9
	SD	6.10	18.40	14.7
	VC	7.58	26.40	20.5
Substation installation and maintenance	Mean	92.39	45.13	77.8
	SD	4.57	20.73	15.0
	VC	4.95	45.93	19.3
Practical SEN	Mean	97.45	92.73	94.6
	SD	2.68	3.79	3.0
	VC	2.75	4.09	3.2

Table 193 shows performance of students in solar energy trade in national examinations across different subjects and years. In Basics of Electricity and Electrical Measurement, there was a significant increase in the variation of scores from 2019 to 2021, with the VC increasing from 9.75 to 41.31. However, in 2022, there was a decrease in the VC to 26.3. This suggests that the performance of students in this subject was more consistent in 2022 compared to 2021, but still more

variable than in 2019. In Electrical Schematic Analysis, there was a substantial increase in the variation of scores from 2019 to 2021, with the VC increasing from 11.84 to 33.64. However, in 2022, there was a decrease in the VC to 16.0. This suggests that the performance of students in this subject was more consistent in 2022 compared to 2021, but still more variable than in 2019. In Solar Power Plant Design and Installation, there was also a significant increase in the variation of scores from 2019 to 2021, with the VC increasing from 7.00 to 31.75. However, in 2022, there was a decrease in the VC to 12.6. This suggests that the performance of students in this subject was more consistent in 2022 compared to 2021, but still more variable than in 2019.

In Solar Water Heating Design and Installation, there was a substantial increase in the variation of scores from 2019 to 2021, with the VC increasing from 7.58 to 26.40. However, in 2022, there was a further decrease in the VC to 20.5. In Substation Installation and Maintenance, there was a dramatic increase in the variation of scores from 2019 to 2021, with the VC increasing from 4.95 to 45.93. However, in 2022, there was a decrease in the VC to 19.3. This suggests that the performance of students in this subject was more consistent in 2022 compared to 2021, but still more variable than in 2019. In Practical Solar Energy, there was a relatively low variation of scores across all three years, with the VC ranging from 2.75 to 4.09. This suggests that the performance of students in this subject was more consistent across the years. The variation in scores across the different subjects and years suggests that the performance of students in some subjects was more consistent than in others. The substantial increase in variation of scores in some subjects from 2019 to 2021 is a cause for concern.

Table 194: Pass rate in Solar Energy trade by school ownership

SEN		2019		2021		2022	
		No.	%	No.	%	No.	%
Basics of electricity and electrical measurement	PU	31	100	13	86.7	19	100
Electrical schematic analysis	PU	31	100	14	93.3	19	100
Solar power plant design and installation	PU	31	100	13	86.7	19	100
Solar water heating design and installation	PU	31	100	14	93.3	19	100
Substation installation and maintenance	PU	31	100	12	80.0	19	100
Practical SEN	PU	31	100	15	100.0	19	100

Table 194 shows that public schools have experienced a decrease in performance in some subjects between 2019 and 2021, but have maintained their performance

in other subjects. Specifically, in Basics of Electricity and electrical measurement and Solar power plant design and Installation, public schools scored 100% in 2019 but experienced a drop-in performance in 2021 before returning to 100% in 2022. In Electrical Schematic analysis and Solar water heating design and installation, public schools scored 100% in 2019 and maintained relatively high scores in 2021 and 2022. However, in Substation installation and maintenance, public schools scored 100% in 2019 but experienced a significant decrease in performance in 2021 before returning to 100% in 2022. In Practical SEN, public schools have maintained a perfect score of 100% across all years.

It's important to note that the provided information does not include the total number of public schools that participated in the examinations, so it's difficult to make any broad conclusions about the overall performance of public schools in the solar energy trade. Additionally, it's possible that factors such as changes in the curriculum, teacher turnover, or resources available to schools may have impacted these scores.

3.5.30 Software Development (SOD) trade

Students' performance and pass rate in SOD trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in SOD.

Table 195: Number of students who sat for Software Development (SOD)

Subjects	2019	2021	2022
Algorithm and programming fundamentals	1573	2134	2216
Database design and development	1573	2134	2216
Practical SOD	1573	2134	2216
System analysis and design	1573	2134	2216
Web application development	1573	2134	2216
Website development	1573	2134	2216

Table 196 shows the total number of students who sat for the Software Development (SOD) National Exams in six subjects across three years – 2019, 2021, and 2022. Across all six subjects, the number of students sitting for the exams increased from 2019 to 2022. Specifically, in 2019, there were 1573 students who sat for the exams for each subject, while in 2021 and 2022, there were 2134 and 2216 students respectively for each subject. This trend suggests an increasing interest in the field of software development among students, or perhaps an increasing recognition of the value of the SOD skills. It is also interesting to note that the number of students who sat for the exams was the same for all six subjects in each year, indicating that there is a relatively even distribution of interest in these different areas of software development. This could also suggest that the SOD

National Exams are designed to be inclusive and relevant to all aspects of the field. Overall, the table provides a snapshot of the total number of students who sat for the various subjects in Software Development over three years, indicating that the attendance for each subject remained consistent in each year across these three years. The attendance trend of SOD trade indicates that there is a high level of interest in Software Development. Further research may be carried out to find out true factors behind this attendance trend.

Table 196: Pass rate trend in Software Development Core subjects

SOD	2019		2021		2022	
	No.	%	No.	%	No.	%
Algorithm and programming fundamentals	1167	74.2	1790	83.9	2014	90.9
Database design and development	1416	90.0	1817	85.1	2176	98.2
System analysis and design	1481	94.2	1723	80.7	2020	91.2
Web application development	924	58.7	1543	72.3	2167	97.8
Website development	1006	64.0	1829	85.7	2182	98.5
Practical SOD	1558	99.0	2123	99.5	2197	99.1

Based on the data in Table 196, shows that there is an overall trend of improvement in the performance of students in the Software Development trade in the national examinations for most subjects over the years 2019, 2021, and 2022. Specifically, in Algorithm and programming fundamentals, students improved from 74.2% in 2019 to 83.9% in 2021 and to 90.9% in 2022. In Database design and development, students scored 90.0% in 2019, 85.1% in 2021, and significantly improved to 98.2% in 2022. In System analysis and design, students scored 94.2% in 2019, dropped to 80.7% in 2021 but improved to an exceptional 91.2% in 2022. In Web application development, students improved from 58.7% in 2019 to 72.3% in 2021 and significantly improved to 97.8% in 2022.

In Website development, students improved from 64.0% in 2019 to 85.7% in 2021 and further improved to 98.5% in 2022. The performance of students in Practical Software Development appears to be consistently high in all three years, with an average score of 99.2% across the three years. In 2019, students scored 99.0%, and there was a slight improvement in 2021, where students scored 99.5%. However, there was a slight drop in performance in 2022, where students scored 99.1%. Nonetheless, the overall high scores indicate that students have a good practical understanding of software development and are able to apply the knowledge and skills learned effectively.

Table 197: Performance in Software Development subjects by Gender

SOD		2019		2021		2022	
		No.	%	No.	%	No.	%
Algorithm and programming fundamentals	Female	525	72.1	803	85.2	942	92.6
	Male	642	76.0	960	82.8	1072	89.4
Database design and development	Female	650	89.3	798	84.7	997	98.0
	Male	766	90.7	985	85	1179	98.3
System analysis and design	Female	679	93.3	781	82.9	922	90.7
	Male	802	94.9	921	79.5	1098	91.6
Web application development	Female	382	52.5	681	72.3	995	97.8
	Male	542	64.1	843	72.7	1172	97.8
Website development	Female	398	54.7	771	81.8	997	98.0
	Male	608	72.0	1032	89	1185	98.8
Practical SOD	Female	721	99.0	938	99.6	1007	99.0
	Male	837	99.1	1151	99.3	1190	99.3

According to the performance by gender in the Software development trade in the national examinations in the mentioned subjects, there are some interesting trends. In Algorithm and programming fundamentals, males outperformed females in 2019. However, in 2021 and 2022, females outperformed males. In Database design and development, males outperformed females by a small margin in 2019, 2021, and 2022. In System analysis and design, males outperformed females in 2019 and 2022, but females outperformed males in 2021. In Web application development and Website development, males outperformed females in 2019, but in 2021 and 2022, both males and females performed exceptionally well, with males slightly outperforming females in all years. In Practical SOD, both males and females performed exceptionally well, with males slightly outperforming females in two years (2019 & 2022). Overall, the trend suggests that females are catching up with males in terms of performance in software development. However, there are still some subjects where males outperform females, and vice versa. It is essential to continue to encourage and support both males and females in pursuing their interests in software development, as it is a crucial field that will play a significant role in shaping the future.

Table 198: Average score, SD & CV of scores in Software Development trade

SEN		2019	2021	2022
Algorithm and programming fundamentals	Mean	53.61	61.5	48.1
	SD	19.99	21.2	21.2
	VC	37.29	34.4	44.0
Database design and development	Mean	65.15	69.4	71.0
	SD	16.96	17.8	20.1
	VC	26.03	25.6	28.3
Practical SOD	Mean	90.75	92.6	91.6
	SD	8.71	7.6	7.8
	VC	9.60	8.2	8.5
System analysis and design	Mean	67.03	67.9	48.4
	SD	15.57	18.9	19.6
	VC	23.23	27.8	40.6
Web application development	Mean	45.11	52.1	65.8
	SD	18.34	19.4	18.9
	VC	40.66	37.1	28.7
Website development	Mean	47.73	61.3	71.3
	SD	18.97	19.1	18.5
	VC	39.74	31.2	25.9

Looking at the performance of students in Table 198 in the trade of software development in national examinations across different subjects and years, we can observe the following;

The average score variation coefficient for Algorithms and programming fundamentals decreased from 37.29 in 2019 to 34.4 in 2021 but increased to 44.0 in 2022. This suggests that there was greater variability in scores in 2022 compared to 2021, despite a lower mean score. For Database design and development, the VC remained relatively stable over the three years, with a slight increase from 26.03 in 2019 to 28.3 in 2022. This suggests that there was consistent variability in scores over the three years, despite an increase in mean score. In Practical Software development the VC remained low and relatively stable over the three years, indicating consistent performance across the cohort. In System analysis and design, the VC increased from 23.23 in 2019 to 27.8 in 2021 and further to 40.6 in 2022, suggesting greater variability in scores in 2022 compared to the previous years. For Web application development, the VC decreased from 40.66 in 2019

to 28.7 in 2022, indicating greater consistency in scores over time, despite an increase in mean score. In Website development, the VC decreased from 39.74 in 2019 to 31.2 in 2021 and further to 25.9 in 2022, suggesting greater consistency in scores over time, despite an increase in mean score.

Overall, the VC provides insights into the degree of consistency or variability in performance over time and can be useful in identifying areas of strength or weakness in the performance of students in the solar energy trade national examinations.

Table 199: Pass rate in Software Development by School Ownership

SOD	ST	2019		2021		2022	
		No.	%	No.	%	No.	%
Algorithm and programming fundamentals	GA	312	89.9	481	95.4	507	98.1
	PR	589	62.4	932	76.6	1152	88.8
	PU	263	96.0	332	96.0	306	93.6
Database design and development	GA	344	99.1	491	97.4	517	100.0
	PR	800	84.7	943	77.5	1270	97.9
	PU	266	97.1	329	95.1	321	98.2
System analysis and design	GA	341	98.3	468	92.9	513	99.2
	PR	864	91.5	887	72.9	1162	89.6
	PU	272	99.3	333	96.2	304	93.0
Web application development	GA	283	81.6	433	85.9	517	100.0
	PR	437	46.3	749	61.5	1267	97.7
	PU	204	74.5	327	94.5	319	97.6
Website development	GA	281	81.0	490	97.2	517	100.0
	PR	499	52.9	962	79.0	1276	98.4
	PU	225	82.1	329	95.1	321	98.2
Practical SOD	GA	347	100.0	504	100.0	517	100.0
	PR	930	98.5	1207	99.2	1282	98.8
	PU	274	100.0	346	100.0	325	99.4

The performance of schools in the software development trade can be interpreted from the data provided as follows: Algorithm and Programming Fundamentals: Public schools consistently perform better than private and Government-aided schools across all years (96.0% in 2019 to 96.0% in 2021). Government-aided consistently perform better than Private schools (89.9% in 2019 to 98.1% in 2022). There has been a significant improvement in private schools' performance over the years, but they still lag behind government-aided schools. Database Design

and Development: Government-aided schools consistently perform better than private and public schools across all years (99.1% in 2019 to 100% in 2022). Public schools perform better than private schools in all years. System Analysis and Design: Public schools perform better than government-aided and private and public schools across all years, except in 2022 (99.2%) where Government-aided schools performed better than public schools. The performance of private schools' performance over the years, still lags behind public and government-aided schools.

Web Application Development: Government-aided schools consistently perform better than private and public schools across all years (81.6% in 2019 to 100% in 2022), except in 2021 where public schools performed better (94.5%), it is worth noting that public schools perform better than private schools in all years except in 2022 where private schools slightly performed better.

Website Development: Government-aided schools consistently perform better than private and public schools across all years (97.2% in 2021 to 100% in 2022). Public schools perform better than private schools in all years except in 2022 where private schools performed better.

Practical SOD: Government-aided schools consistently perform better than private and public schools across all years (100% in all years). Public schools consistently perform better than private schools across all years.

Overall, government-aided schools perform consistently better than private and public schools across most subjects in all years. Public schools have shown some improvement in their performance over the years, but they still lag behind government-aided schools. Private schools' performance is variable, with some subjects but they consistently lag behind government-aided and public schools in all subjects.

3.5.31 Tailoring (TAL) Trade

Students' performance and pass rate in SOD trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in SOD.

Table 200: Number of students who sat for the trade of Tailoring (TAL)

Subjects	2019	2021	2022
Caring of textile fibre and garment	247	515	494
Embroidery material tools and equipment	247	515	494
Make fashion and embroidery design	247	515	494
Practical TAL	247	515	494
Structure fabric	247	515	494
Technical drawing	247	515	494

Table 200 provides data on the number of students who sat for the National Exams in the Tailoring (TAL) trade across three years: 2019, 2021, and 2022. Specifically, the table shows the number of students who sat for the exams in the six different subjects. The number of students who attended these subjects in 2019 was 247 for each subject. In the academic year 2021, the number of students increased to 515 for each subject, which is more than twice the number of students who sat in 2019. However, in the most recent academic year, 2022, the number of students decreased to 494 for each subject, compared to the previous year. Overall, the data shows that there was a significant increase in the number of students offering the TAL program in 2021 compared to 2019, but the number decreased slightly in 2022. It could indicate that there was an initial surge in interest in TAL during the 2021, but the numbers may have stabilized afterward. Further analysis may be needed to understand the trend in more detail.

Table 201: Pass rate trend in Tailoring Core subjects

TAL	2019		2021		2022	
	No.	%	No.	%	No.	%
Caring of textile fibre and garment	231	93.5	494	95.9	488	98.8
Embroidery material tools and equipment	223	90.3	505	98.1	494	100.0
Make fashion and embroidery design	233	94.3	488	94.8	493	99.8
Structure fabric	234	94.7	447	86.8	490	99.2
Technical drawing	239	96.8	510	99.0	493	99.8
Practical TAL	245	99.2	515	100.0	494	100.0

Table 202 indicates the frequency and pass rates of different subjects for three years, 2019, 2021, and 2022. Looking at the table above, the following observations have been mentioned: For Caring of textile fibre and garment: This subject has consistently high pass rates over the years, with 93.5%, 95.9%, and 98.8% for 2019, 2021, and 2022, respectively. Embroidery material tools and equipment: This subject also has consistently high pass rates over the years, with 90.3%, 98.1%, and 100.0% for 2019, 2021, and 2022, respectively. Make fashion and embroidery design: This subject has high pass rates for 2019 and 2022, with 94.3% and 99.8%, respectively, but a slightly lower pass rate for 2021, with 94.8%. Structure fabric: This subject has high pass rates for 2019 and 2022, with 94.7% and 99.2%, respectively, but a lower pass rate for 2021, with 86.8%. Technical drawing: This subject has consistently high pass rates over the years, with 96.8%, 99.0%, and 99.8% for 2019, 2021, and 2022, respectively. Practical TAL: This subject has consistently high pass rates of 99.2%, 100.0%, and 100.0% for 2019, 2021, and 2022, respectively. In summary, all subjects have high pass rates, with some subjects having consistently high pass rates over the years. The subjects that had lower pass rates for some years bounced back to high pass rates in the next year.

Table 202: Pass rate in TAL trade by Gender

TAL		2019		2021		2022	
		No.	%	No.	%	No.	%
Caring of textile fibre and garment	Female	203	92.7	449	95.9	442	98.7
	Male	28	100.0	45	95.7	46	100.0
Embroidery material tools and equipment	Female	195	89.0	459	98.1	448	100.0
	Male	28	100.0	46	97.9	46	100.0
Make fashion and embroidery design	Female	205	93.6	441	94.2	447	99.8
	Male	28	100.0	47	100	46	100.0
Structure fabric	Female	206	94.1	402	85.9	444	99.1
	Male	28	100.0	45	95.7	46	100.0
Technical drawing	Female	211	96.3	464	99.1	447	99.8
	Male	28	100.0	46	97.9	46	100.0
Practical TAL	Female	217	99.1	468	100	448	100.0
	Male	28	100.0	47	100	46	100.0

Table 202 shows the percentage of students who passed in each subject based on gender over the years (2019, 2021 and 2022). For Caring of textile fibre and garment: The percentage of female students who passed this subject was high across all years, ranging from 92.7% in 2019 to 98.7% in 2022. The percentage of male students who passed was also high, ranging from 95.7% to 100%. For Embroidery material tools and equipment: The percentage of female students who passed this subject was high across all years, ranging from 89.0% in 2019 to 100% in 2022. The percentage of male students who passed was also high, ranging from 97.9% to 100%. For Make fashion and embroidery design: The percentage of female students who passed this subject was high across all years, ranging from 93.6% in 2019 to 99.8% in 2022. The percentage of male students who passed was also high, ranging from 100% to 100%. For Structure fabric: The percentage of female students who passed this subject was high in 2019 and 2022 (94.1% and 99.1% respectively), but lower in 2021 (85.9%). The percentage of male students who passed was high across all years, ranging from 95.7% to 100%. For Technical drawing: The percentage of female students who passed this subject was high across all years, ranging from 96.3% in 2019 to 99.8% in 2022. The percentage of male students who passed was also high, ranging from 97.9% to 100%. For Practical TAL: The percentage of female and male students who passed this subject was consistently high across all years, ranging from 99.1% to 100%. Overall, the data suggests that both female and male students performed well in these TAL subjects over the years, with high passing rates across the board. There were some minor fluctuations in passing rates for certain subjects in certain years, but the overall trend is positive.

Table 203: Average score, SD & CV of scores in TAL trade

TAL		2019	2021	2022
Caring of textile fibre and garment	Mean	59.80	73.83	60.1
	SD	11.81	11.81	15.7
	VC	19.75	15.99	26.2
Embroidery material tools and equipment	Mean	58.44	81.97	72.2
	SD	13.63	11.14	11.6
	VC	23.33	13.59	16.1
Make fashion and embroidery design	Mean	69.58	82.19	70.6
	SD	14.34	10.25	13.3
	VC	20.61	12.47	18.9
Structure fabric	Mean	60.70	63.97	57.5
	SD	12.63	12.43	15.0
	VC	20.80	19.43	26.1
Technical drawing	Mean	72.26	77.69	70.6
	SD	12.87	12.92	15.3
	VC	17.81	16.63	21.6
Practical TAL	Mean	87.51	91.86	93.8
	SD	9.52	5.20	4.9
	VC	10.88	5.66	5.2

The table 203 shows the mean scores, standard deviation (SD), and coefficient of variation (CV) for different subjects of TAL over three academic years, 2019, 2021, and 2022. Here are some observations based on the provided data: Caring of textile fibre and garment: The mean score was the highest in 2021, but the standard deviation and coefficient of variation were also the highest in that year. This indicates that there was a wider range of scores in 2021, with some students performing significantly better or worse than the average. Embroidery material tools and equipment: The mean score increased from 2019 to 2021 and decreased slightly in 2022. The standard deviation and coefficient of variation decreased steadily from 2019 to 2022, indicating that the scores became more consistent over time. Make fashion and embroidery design: The mean score was highest in 2021, but the standard deviation and coefficient of variation were also relatively high in that year. The CV decreased from 2019 to 2021 but increased again in 2022. This suggests that there was some variation in scores across different students and years. Structure fabric: The mean score was lowest in 2022, and the standard deviation and coefficient of variation were the highest in that year. This indicates that there was more variability in scores in 2022, with some students performing

significantly better or worse than others. Technical drawing: The mean score was highest in 2019 and decreased slightly in subsequent years. The standard deviation and coefficient of variation remained relatively consistent over the three years, indicating that there was consistent variation in scores across different students and years. Practical TAL: The mean score increased consistently over the three years, while the standard deviation and coefficient of variation decreased steadily. This suggests that students' performance in practical TAL became more consistent over time. Overall, the data presented in the table show that the performance of students varied across different subjects and years, with some subjects showing consistent improvement and others showing more variability in scores.

Table 204: Pass rate in TAL trade by school ownership

TAL		2019		2021		2022	
		No.	%	No.	%	No.	%
Caring of textile fibre and garment	GA	36	97.3	161	98.8	142	99.3
	PR	117	92.9	152	93.8	149	99.3
	PU	78	92.9	181	95.8	196	98
Embroidery material tools and equipment	GA	35	94.6	162	99.4	143	100
	PR	110	87.3	158	97.5	150	100
	PU	78	92.9	184	97.4	200	100
Make fashion and embroidery design	GA	36	97.3	157	96.3	142	99.3
	PR	120	95.2	150	92.6	150	100
	PU	77	91.7	180	95.2	200	100
Practical TAL	GA	36	97.3	163	100.0	143	100
	PR	126	100.0	162	100.0	150	100
	PU	83	98.8	189	100.0	200	100
Structure fabric	GA	35	94.6	145	89.0	141	98.6
	PR	122	96.8	142	87.7	149	99.3
	PU	77	91.7	160	84.7	199	99.5
Technical drawing	GA	36	97.3	162	99.4	142	99.3
	PR	123	97.6	162	100.0	150	100
	PU	80	95.2	185	97.9	200	100

Based on the data provided in table 204, the pass frequency for each subject according to school ownership (Government Aided schools (GA), Private schools (PR), and Public schools (PU) in the years 2019, 2021, and 2022 can be analysed.

For the subject of “Caring of textile fibre and garment”, it can be observed that the pass rate is consistently high across all three years and all three types of school ownership. In 2019, the pass rate was 97.3% for GA, 92.9% for PR, and 92.9% for PU. In 2021, the pass rate increased to 98.8% for GA, 93.8% for PR, and 95.8% for PU. In 2022, the pass rate remained high, with values of 99.3% for GA, 99.3% for PR, and 98% for PU. For the subject of “Embroidery material tools and equipment”, we can see that the pass rate is also consistently high across all three years and all three types of school ownership. In 2019, the pass rate was 94.6% for GA, 87.3% for PR, and 92.9% for PU. In 2021, the pass rate increased to 99.4% for GA, 97.5% for PR, and 97.4% for PU. In 2022, the pass rate remained high, with values of 100% for all three types of school ownership.

For the subject of “Make fashion and embroidery design”, it is also observed that the pass rate is consistently high across all three years and all three types of school ownership. In 2019, the pass rate was 97.3% for GA, 95.2% for PR, and 91.7% for PU. In 2021, the pass rate slightly decreased to 96.3% for GA, 92.6% for PR, and 95.2% for PU. In 2022, the pass rate remained high, with values of 99.3% for GA, 100% for PR, and 100% for PU. For the subject of “Structure fabric”, the pass rate is consistently high across all three years and all three types of school ownership, although there is a slight decrease in 2021 for PR and PU. In 2019, the pass rate was 94.6% for GA, 96.8% for PR, and 91.7% for PU. In 2021, the pass rate decreased to 89.0% for GA, 87.7% for PR, and 84.7% for PU. In 2022, the pass rate remained high, with values of 98.6% for GA, 99.3% for PR, and 99.5% for PU.

For Structure Fabric, GA schools had the highest pass rate in 2019 and 2022, while PR schools had the highest pass rate in 2021. PU schools had consistently high pass rate across all three years, with a 99.5% pass rate in 2022. In Technical Drawing, GA schools had the highest pass rate in all three years, with a pass rate of 99.3% in 2021 and 2022. PR and PU schools also had consistently high pass rate across all three years, with a perfect pass rate of 100% in 2021 and 2022. For the subject of “Practical TAL”, the pass rate is consistently high across all three years and all three types of school ownership. In 2019, the pass rate was 97.3% for GA, 100% for PR, and 98.8% for PU. In 2021, the pass rate remained high, with values of 100% for all three types of school ownership. In 2022, the pass rate remained high, with values of 100% for all three types of school ownership.

Overall, it appears that PU schools had consistently high pass rate in most subjects across all three years.

3.5.32 Telecommunication (TEL) trade

Students' performance and pass rate in TEL trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in TEL

Table 205: Number of students who sat for Telecommunication (TEL)

Subjects	2019	2021	2022
Broadcasting transmission system	291	160	145
GSM transmission system operations	291	160	145
Practical TEL	291	160	145
Radio broadcasting station	291	160	145
RF and microwave antenna system installation	291	160	145
TV broadcasting station	291	160	145

Table 205 provides information on the total number of students who sat for the National Exams in the Telecommunication (TEL) across the three academic years – 2019, 2021, and 2022. The data is further broken down into six specific subjects or areas of study within the TEL field. The number of students who sat for the National Exams in TEL has remained constant in each year over the three years. However, the number of students offering some specific subjects has decreased significantly over the last two years. In 2021 and 2022, the total number of students attending all six subjects has decreased to 160 and 145, respectively, indicating a drop in the overall popularity of these subjects. Overall, the table suggests that the number of students interested in pursuing programs related to TEL has decreased over the years, and it may be important to understand the reasons behind this trend and find ways to attract more students to the field.

Table 206: Pass rate trend in Telecommunication in Core subjects

TEL	2019		2021		2022	
	No.	%	No.	%	No.	%
Broadcasting transmission system	241	82.8	140	87.5	134	92.4
GSM transmission system operations	287	98.6	130	81.3	130	89.7
Radio broadcasting station	237	81.4	143	89.4	142	97.9
RF and microwave antenna system installation	276	94.8	136	85.0	145	100.0
TV broadcasting station	220	75.6	133	83.1	140	96.6
Practical TEL	289	99.3	160	100.0	145	100.0

Table 206 shows the pass rate of different TEL (Telecommunications) subjects in the years 2019, 2021, and 2022. It can be observed that the practical TEL had the highest pass rate in all the years, with 99.3% pass rate in 2019, 100% in 2021, and 100% in 2022. This suggests that practical TEL was the most common subject performed in the telecommunication trade in the given time frame.

Among the other subjects, the RF and Microwave antenna system installation subject had the second-highest pass rate in all three years, with a pass rate of 94.8% in 2019, 85.0% in 2021, and 100% in 2022. The broadcasting transmission system subject had the third-highest pass rate in 2019, with 82.8%, followed by radio broadcasting station subject with 81.4%. However, in the following years, their pass rate increased, with the broadcasting transmission system having a pass rate of 87.5% in 2021 and 92.4% in 2022, and the radio broadcasting station having a pass rate of 89.4% in 2021 and 97.9% in 2022.

The GSM transmission system operations and TV broadcasting station subjects had the highest pass rate in 2019, with 98.6% and 75.6%, respectively. However, their pass rate decreased in the following years, with the GSM transmission system operations having a pass rate of 81.3% in 2021 and 89.7% in 2022, and the TV broadcasting station having a pass rate of 83.1% in 2021 and 96.6% in 2022. In conclusion, the table shows that practical TEL and RF and microwave antenna system installation were the most common subjects performed in the telecommunications trade during the given time frame. However, the pass rates of other subjects varied over the years, with some increasing and some decreasing.

Table 207: Pass rate in TEL Trade by Gender

TEL		2019		2021		2022	
		No.	%	No.	%	No.	%
Broadcasting transmission system	Female	64	82.1	55	90.2	57	90.5
	Male	177	83.1	85	85	77	93.9
GSM transmission system operations	Female	78	100.0	50	82	55	87.3
	Male	209	98.1	80	80	75	91.5
Radio broadcasting station	Female	64	82.1	54	88.5	60	95.2
	Male	173	81.2	89	89	82	100.0
RF and microwave antenna system installation	Female	76	97.4	53	86.9	63	100.0
	Male	200	93.9	83	83	82	100.0
TV broadcasting station	Female	58	74.4	49	80.3	59	93.7
	Male	162	76.1	84	84	81	98.8
Practical TEL	Female	78	100.0	61	100	63	100.0
	Male	211	99.1	100	100	82	100.0

Table 207 shows the percentage of students who passed various Telecommunications (TEL) subjects in 2019, 2021, and 2022, disaggregated by gender. In 2019, the pass rates for all trades were higher for males than for females, with the exception of the GSM transmission system operations trade, which had a 100% pass rate for females. In 2021 and 2022, the pass rates increased for all trades and for both female and male. In 2021 and 2022, the pass rates for females were generally higher than in 2019, but still lower than those for males.

The trade with the highest pass rate for both genders in all years was Practical TEL, with a 100% pass rate. The trade with the lowest pass rate for both genders in all years was Radio broadcasting station, with a pass rate ranging from 80.3% to 100%. Overall, the data suggests that there are gender differences in TEL pass rates, with males generally performing better than females. However, pass rates for both genders increased over time, indicating improvement in overall performance. It is important to note that this analysis is based on a limited dataset and should be interpreted with caution. Further research and data are needed to fully understand gender differences in TEL performance.

Table 208: Average score, SD & CV for scores in TEL trade

TEL		2019	2021	2022
Broadcasting transmission system	Mean	58.28	60.66	44.4
	SD	18.32	14.94	16.7
	VC	31.44	24.63	37.5
GSM transmission system operations	Mean	74.81	59.92	38.9
	SD	9.68	11.84	14.3
	VC	12.94	19.76	36.6
Radio broadcasting station	Mean	56.26	61.87	65.7
	SD	17.58	18.59	21.5
	VC	31.25	30.05	32.7
RF and microwave antenna system installation	Mean	64.21	62.08	68.2
	SD	11.56	17.39	15.8
	VC	18.00	28.02	23.2
TV broadcasting station	Mean	49.46	56.01	63.3
	SD	14.77	18.81	20.2
	VC	29.86	33.58	31.9
Practical TEL	Mean	92.37	96.10	94.3
	SD	4.94	2.97	5.6
	VC	5.35	3.09	5.9

Table 208 displays the mean scores of different TEL (Telecommunication) subjects in the years 2019, 2021, and 2022, along with their standard deviation (SD) and coefficient of variation (CV) values. Looking at the mean scores, it reveals that the performance of students in different TEL subjects has varied across the years. Some subjects, such as Radio broadcasting station and RF and microwave antenna system installation, have shown an improvement in mean scores over the years. In contrast, subjects like GSM transmission system operations and TV broadcasting station have shown a decline in mean scores over the years.

looking at the standard deviation (SD) values, which represent the amount of variation or dispersion in the data. A higher SD indicates that the data points are more spread out from the mean, whereas a lower SD indicates that the data points are closer to the mean. We can see that the SD values for all the TEL subjects have varied over the years. For example, the SD value for GSM transmission system operations increased from 9.68 in 2019 to 14.3 in 2022, indicating that the scores in this subject became more dispersed over time. Similarly, the SD value for TV broadcasting station increased from 14.77 in 2019 to 20.2 in 2022, indicating a higher level of variability in scores. Finally, let's consider the coefficient of variation (CV) values, which represent the relative variability of the data compared to the mean. A higher CV value indicates that the data has higher variability relative to the mean, whereas a lower VC value indicates lower variability relative to the mean. We can see that the CV values for all the TEL subjects have also varied over the years. For example, the CV value for GSM transmission system operations increased from 12.94 in 2019 to 36.6 in 2022, indicating a higher level of relative variability in scores. Similarly, the CV value for RF and microwave antenna system installation increased from 18.00 in 2019 to 23.2 in 2022. In summary, the analysis of the table above shows that the performance of students in different TEL subjects has varied over the years, and there has also been variation in the level of dispersion and relative variability of scores across the years.

Table 209: Pass rate in TEL by school ownership

TEL		2019		2021		2022	
		No.	%	No.	%	No.	%
Broadcasting transmission system	GA						
	PR	138	83.1	81	81.0	75	91.46
	PU	100	89.3	59	100.0	51	96.23
GSM transmission system operations	GA						
	PR	164	98.8	71	71.0	77	93.9
	PU	112	100.0	59	100.0	53	100
Radio broadcasting station	GA						
	PR	131	78.9	84	84.0	80	97.56
	PU	101	90.2	59	100.0	52	98.11

RF and microwave antenna system installation	GA						
	PR	161	97.0	80	80.0	74	90.24
	PU	110	98.2	56	94.9	52	98.11
TV broadcasting station	GA						
	PR	119	71.7	76	76.0	82	100
	PU	98	87.5	57	96.6	53	100
Practical TEL	GA						
	PR	164	98.8	100	100.0	82	100
	PU	112	100.0	59	100.0	53	100

Table 209 provides information on the pass rates for different subjects in Telecommunication (TEL) trade in the years 2019, 2021, and 2022. The pass rates are grouped based on school ownership (Government Aided (GA), Private (PR), and Public (PU)). Based on the table, the following observations can be made: Broadcasting transmission system subject: The pass rates for the PR and PU schools were high in 2019, with 83.1% and 89.3%, respectively. However, in 2021, the pass rates dropped to 81.0% for PR schools and 100.0% for PU schools. In 2022, the pass rates for PR schools increased slightly to 91.46%, while for PU schools, the pass rates decreased to 96.23%. GSM transmission system operations subject: The pass rates for both PR and PU schools were high in 2019, with 98.8% and 100.0%, respectively. However, in 2021, the pass rates dropped significantly to 71.0% for PR schools and remained the same for PU schools. In 2022, the pass rates for PR schools improved slightly to 93.9%, while for PU schools, the pass rates decreased slightly to 100.0%.

Radio broadcasting station subject: The pass rates for both PR and PU schools were high in 2019, with 78.9% and 90.2%, respectively. In 2021, the pass rates improved to 84.0% for PR schools and 100.0% for PU schools. In 2022, the pass rates for both PR and PU schools further increased to 97.56% and 98.11%, respectively. RF and microwave antenna system installation subject: The pass rates for both PR and PU schools were high in 2019, with 97.0% and 98.2%, respectively. However, in 2021, the pass rates dropped to 80.0% for PR schools and 94.9% for PU schools. In 2022, the pass rates for both PR and PU schools slightly improved to 90.24% and 98.11%, respectively. TV broadcasting station subject: The pass rates for both PR and PU schools were high in 2019, with 71.7% and 87.5%, respectively. In 2021, the pass rates improved to 76.0% for PR schools and 96.6% for PU schools. In 2022, the pass rates for both PR and PU schools further increased to 100.0% and 100.0%, respectively.

Practical TEL: The pass rates for both PR and PU schools were high in all the three years, with 98.8% and 100.0%, respectively, in 2019, and 100.0% and 100.0%, respectively, in 2021 and 2022. In summary, the pass rates for TEL trade varied across different subjects and years, with some subjects experiencing a drop-in pass rates in 2021 but improving in 2022. Overall, the pass rates for PR and PU schools were high for most subjects in all the three years.

3.5.33 Tourism (TRS) trade

The performance and pass rate of students in TRS trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in TRS.

Table 210: Total number of students who attended the trade of Tourism (TRS)

Subjects	2019	2021	2022
Booking suppliers services and processing reservations	1323	1511	2159
Developing tourism products	1323	1511	2159
Packaging tourism products	1323	1511	2159
Performing community-based tourism	1323	1511	2159
Practical TRS	1323	1511	2159
Working as a guide	1323	1511	2159

Table 210 shows the total number of students who sat for the National Exams in the field of Tourism (TRS) across three academic years: 2019, 2021, and 2022. The National Exams for TRS cover five subjects. Across the three years, for each year, there is no variation in the number of students who attended each subject. Specifically, the total number of students who sat for the exam each subject in 2019 is the same as the number of students who sat in 2021 and 2022. Each subject was registered a total of 1323 students in 2019, 1511 students in 2021, and 2159 students in 2022 who sat for the exams respectively. This indicates that there was an increase in the number of students pursuing TRS National Exams across the years, with a rise of 188 students (i.e., from 1323 in 2019 to 1511 in 2021) and an additional increase of 648 students (i.e., from 1511 in 2021 to 2159 in 2022). Overall, the table suggests that the number of students interested in pursuing programs related to TRS has increased over the years, and there is a growing interest in the field. This could be due to various factors, such as the growth of the tourism industry, the increasing demand for skilled professionals in the field, and the availability of diverse job opportunities.

Table 211: Pass rate trend in Tourism trade Core subjects

TRS	2019		2021		2022	
	No.	%	No.	%	No.	%
Booking suppliers services and processing reservations	960	72.6	1243	82.3	2053	95.2
Developing tourism products	992	75.0	1291	85.4	2100	97.4
Packaging tourism products	641	48.5	1315	87.0	1909	88.5
Performing community- based tourism	1145	86.5	1244	82.3	2053	95.2
Working as a guide	1165	88.1	1381	91.4	2117	98.2
Practical TRS	1304	98.6	1499	99.2	2159	100.0

Based on the data provided in the table 211, the following pass rates can be observed by subject for the years 2019, 2021, and 2022: Booking suppliers services and processing reservations: In 2019, the pass rate for this subject was 72.6%. This increased to 82.3% in 2021 and further increased to 95.2% in 2022. Developing tourism products: In 2019, the pass rate for this subject was 75.0%. This increased to 85.4% in 2021 and further increased to 97.4% in 2022. Packaging tourism products: In 2019, the pass rate for this subject was 48.5%. This increased significantly to 87.0% in 2021 and further increased to 88.5% in 2022. Performing community-based tourism: In 2019, the pass rate for this subject was 86.5%. This remained almost the same at 82.3% in 2021 and then increased to 95.2% in 2022. Working as a guide: In 2019, the pass rate for this subject was 88.1%. This increased to 91.4% in 2021 and further increased to 98.2% in 2022. Practical TRS: In 2019, the pass rate for this subject was 98.6%. This increased slightly to 99.2% in 2021 and then increased to a perfect score of 100.0% in 2022. Overall, we can see that there has been a significant improvement in the pass rates for most of the subjects over the years. The pass rates have generally increased or remained stable, which is a positive trend. Particularly noteworthy is the increase in pass rates for subject in tourism, which had the lowest pass rate in 2019 but improved significantly in the subsequent years.

Table 212: Pass rate by Gender in Tourism trade

TRS		2019		2021		2022	
		No.	%	No.	%	No.	%.
Booking suppliers services and processing reservations	Female	682	71.3	871	81.2	1388	96.3
	Male	278	75.7	443	82.8	665	93.1
Developing tourism products	Female	715	74.8	900	83.9	1432	99.3
	Male	277	75.5	446	83.4	668	93.4
Packaging tourism products	Female	455	47.6	914	85.2	1351	93.7
	Male	186	50.7	457	85.4	558	78.0
Performing community-based tourism	Female	831	86.9	867	80.8	1402	97.2
	Male	314	85.6	438	81.9	637	89.1
Working as a guide	Female	843	88.2	975	90.9	1429	99.1
	Male	322	87.7	485	90.7	688	96.2
Practical TRS	Female	946	99.0	1067	99.4	1442	100.0
	Male	358	97.5	525	98.1	717	100.0

Based on the given data in table 212, the trends in gender distribution across different TRS subjects over the years 2019, 2021, and 2022 can be analysed as follows: Booking suppliers services and processing reservations: In 2019, 71.3% of those in this subject were female, and 75.7% were male. In 2021, the percentage of females increased to 81.2%, while that of males increased to 82.8%. While in 2022, the percentage of females further increased to 96.3%, while that of males increased to 93.1%. Developing tourism products: In 2019, 74.8% of those in this subject were female, and 75.5% were male. In 2021, the percentage of females increased to 83.9%, while that of males increased to 83.4%. In 2022, the percentage of females further increased to 99.3%, while that of males increased to 93.4%. Packaging tourism products: In 2019, 47.6% of those in this subject were female, and 50.7% were male. In 2021, the percentage of females increased significantly to 85.2%, while that of males increased slightly to 85.4%. In 2022, the percentage of females further increased to 93.7%, while that of males decreased to 78.0%.

Performing community-based tourism: In 2019, 86.9% of those in this subject were female, and 85.6% were male. In 2021, the percentage of females decreased to 80.8%, while that of males increased to 81.9%. In 2022, the percentage of females further increased to 97.2%, while that of males increased to 89.1%. Working as a guide: In 2019, 88.2% of those in this subject were female, and 87.7% were male. In 2021, the percentage of females increased to 90.9%, while that of males increased to 90.7%. In 2022, the percentage of females further increased to 99.1%, while that of males increased to 96.2%. Practical TRS: In all three years, the percentage of females in this subject was higher than that of males, with 99.0%, 99.4%, and

100.0% in 2019, 2021, and 2022, respectively. Overall, we can see that there is a general trend of increasing female students in most TRS subjects over the years. The largest increase in female students was seen in Packaging tourism products, while the highest percentage of female students in all three years was seen in Practical TRS.

Table 213: Average score. SD & VC Variation Coefficient in Tourism

TRS		2019	2021	2022
Booking suppliers services and processing reservations	Mean	52.71	67.29	65.0
	SD	19.16	19.74	23.5
	VC	36.35	29.33	36.1
Developing tourism products	Mean	56.72	76.68	66.5
	SD	22.46	18.29	21.8
	VC	39.59	23.85	32.8
Packaging tourism products	Mean	39.68	80.97	53.4
	SD	16.61	18.70	25.2
	VC	41.86	23.09	47.2
Performing community- based tourism	Mean	68.96	68.36	58.4
	SD	22.18	20.06	21.9
	VC	32.16	29.35	37.6
Working as a guide	Mean	65.14	82.50	69.4
	SD	19.29	15.99	20.3
	VC	29.61	19.39	29.3
Practical TRS	Mean	90.20	91.35	92.5
	SD	6.76	7.54	5.6
	VC	7.50	8.25	6.0

The data provided in the table 213 showing mean scores, standard deviation, and coefficient of variation (CV) for different tourism-related subjects over three years: 2019, 2021, and 2022. Mean score is a measure of central tendency and represents the average score obtained by students in each subject. Standard deviation (SD) indicates the degree of variation or spread in the scores. Coefficient of variation (CV) shows the relative variability of the scores, with higher CV indicating greater variability. Looking at the table above, we realize that In Booking suppliers' services and processing reservations: The mean score increased from 52.71 in 2019 to 67.29 in 2021 and slightly decreased to 65.0 in 2022. The SD remained relatively stable, but the CV decreased in 2022 compared to the previous year. Developing tourism products: The mean score increased from 56.72 in 2019 to 76.68 in 2021 and then

decreased to 66.5 in 2022. The SD and CV both decreased in 2022 compared to the previous year. Packaging tourism products: The mean score increased dramatically from 39.68 in 2019 to 80.97 in 2021 and then decreased to 53.4 in 2022. The SD and CV both increased in 2021, indicating greater variability in the scores, but decreased in 2022. Performing community-based tourism: The mean score decreased from 68.96 in 2019 to 68.36 in 2021 and then to 58.4 in 2022. The SD and CV remained relatively stable over the three years.

Working as a guide: The mean score increased from 65.14 in 2019 to 82.5 in 2021 and then slightly decreased to 69.4 in 2022. The SD and CV both decreased in 2022 compared to the previous year.

Practical TRS: The mean score remained consistently high over the three years, with a slight increase from 90.20 in 2019 to 91.35 in 2021 and then to 92.5 in 2022. The SD and CV both remained relatively stable over the three years. In summary, there are some subjects that show consistent improvement in mean scores, such as Working as a guide and Practical TRS. However, some subjects show a decline in mean scores over the years, such as Performing community-based tourism and Developing tourism products. The variability in scores also varies across subjects, with Packaging tourism products showing the highest CV.

Table 214: Pass rate in Tourism by school ownership

TRS		2019		2021		2022	
		No.	%	No.	%	No.	%
Booking suppliers services and processing reservations	GA	71	100.0	84	100.0	60	100.0
	PR	670	68.0	825	82.1	1136	97.2
	PU	137	99.3	120	100.0	298	93.4
Developing tourism products	GA	71	100.0	84	100.0	60	100.0
	PR	729	74.0	872	86.8	1159	99.1
	PU	138	100.0	120	100.0	313	98.1
Packaging tourism products	GA	64	90.1	84	100.0	60	100.0
	PR	406	41.2	894	89.0	1132	96.8
	PU	119	86.2	119	99.2	265	83.1
Performing community-based tourism	GA	71	100.0	84	100.0	60	100.0
	PR	857	87.0	828	82.4	1133	96.8
	PU	138	100.0	119	99.2	301	94.4
Working as a guide	GA	71	100.0	84	100.0	60	100.0
	PR	867	88.0	922	91.7	1163	99.4
	PU	138	100.0	120	100.0	313	98.1

Practical TRS	GA	71	100.0	84	100.0	60	100.0
	PR	972	98.7	999	99.4	1172	100.0
	PU	138	100.0	120	100.0	319	100.0

The table above provided, the frequency and percentage of passes for each subject and school ownership over the years 2019, 2021, and 2022. According to the data provided in the table above; in Booking Suppliers Services and Processing Reservations: GA schools had a pass rate of 100% in all three years. PR schools had a pass rate of 68.0% in 2019, which increased to 82.1% in 2021 and then to 97.2% in 2022. And PU schools had a pass rate of 99.3% in 2021 and 100% in both 2019 and 2022. In Developing Tourism Products: GA schools had a pass rate of 100% in all three years. PR schools had a pass rate of 74.0% in 2019, which increased to 86.8% in 2021 and then to 99.1% in 2022. While PU schools had a pass rate of 100% in all three years. For Packaging Tourism Products subject: GA schools had a pass rate of 90.1% in 2019, which increased to 100% in both 2021 and 2022. PR schools had a pass rate of 41.2% in 2019, which increased to 89.0% in 2021 and then to 96.8% in 2022. PU schools had a pass rate of 86.2% in 2019, 99.2% in 2021, and 83.1% in 2022. For Performing Community-Based Tourism subject: GA schools had a pass rate of 100% in all three years. PR schools had a pass rate of 87.0% in 2019, which decreased slightly to 82.4% in 2021 and then increased to 96.8% in 2022. PU schools had a pass rate of 100% in 2019, 99.2% in 2021, and 94.4% in 2022. For Working as a Guide subject: GA schools had a pass rate of 100% in all three years. PR schools had a pass rate of 88.0% in 2019, which increased to 91.7% in 2021 and then to 99.4% in 2022, and PU schools had a pass rate of 100% in all three years. In Practical TRS: GA schools had a pass rate of 100% in all three years. PR schools had a pass rate of 98.7% in 2019, which increased to 99.4% in 2021 and then to 100% in 2022, while PU schools had a pass rate of 100% in all three years. In general, it seems that all three school ownership categories (GA, PR, and PU) showed improvements in pass rates over the years, especially in 2022. However, there were some subjects and school ownership that had lower pass rates than others, such as Packaging Tourism Products in PR and PU. It would be interesting to investigate the reasons behind these differences and see how they can be improved.

3.5.34 Welding (WEL) Trade

The performance and pass rate of students in WEL trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in WEL.

Table 215: Total number of student who attended in the trade of Welding (WEL)

Subjects	2019	2021	2022
Advanced welding	28	89	134
Gas welding and brazing	28	89	134
Metal work	28	89	134
Practical WEL	28	89	134
Shielded metal arc welding (SMAW)	28	89	134
Technical drawing and DCG	28	89	134

Table 215 shows the total number of students who sat for the national exams in the field of Welding (WEL) across the three academic years: 2019, 2021, and 2022. The programs offered in the field of WEL include six subjects. Across the three years, there is a clear increase in the number of students who attended each subject. Specifically, the total number of students who sat for each subject in 2019 is significantly lower than the total number of students who sat in 2021 and 2022. Each program had a total of 28 students in 2019, 89 students in 2021, and 134 students in 2022. This indicates a rise in the number of students that pursued WEL programs across the three years, with an increase of 61 students (i.e., from 28 in 2019 to 89 in 2021) and an additional increase of 45 students (i.e., from 89 in 2021 to 134 in 2022). Overall, the table suggests that there is a growing interest in pursuing programs related to Welding (WEL), and the number of students interested in the field is increasing. This could be due to various factors, such as the growing demand for skilled professionals in the field, the availability of diverse job opportunities, and the rising importance of metalworking in different industries which is likely to create more job opportunities and contribute to the overall economic growth. It is noteworthy that all six subjects/programs had a similar increase in the number of students attending across the three years, indicating that the interest in different areas within the field of WEL is equally distributed.

Table 216: Pass rate trend in Welding in Core subjects

WEL	2019		2021		2022	
	No.	%	No.	%	No.	%
Advanced welding	28	100	88	98.9	134	100
Gas welding and brazing	28	100	88	98.9	134	100
Metal work	28	100	78	87.6	134	100
Shielded metal arc welding (SMAW)	28	100.0	89	100.0	134	100
Technical drawing and DCG	27	96.4	79	88.8	134	100
Practical WEL	28	100	89	100.0	134	100

Table 216 shows the pass rate by subject in Welding (WEL) trade over the years 2019, 2021, and 2022. From the data, we can see that: Advanced welding and gas welding and brazing had a 100% pass rate in 2019, and the pass rate remained high at 98.9% in 2021 and 100% in 2022. Metal work had a 100% pass rate in 2019, which decreased to 87.6% in 2021, but then increased again to 100% in 2022. Shielded metal arc welding (SMAW) had a 100% pass rate in both 2019 and 2021, and the pass rate remained the same at 100% in 2022. Technical drawing and DCG had a pass rate of 96.4% in 2019, which decreased to 88.8% in 2021, but then increased again to 100% in 2022. Practical WEL had a 100% pass rate in both 2019 and 2021, and the pass rate remained the same at 100% in 2022. Overall, most of the subjects had a high pass rate throughout the years, with some fluctuations. Technical drawing and DCG had the lowest pass rate in 2021, but the pass rate improved in the following year. The pass rate for metal work also decreased in 2021 but improved in the following year. The other subjects had a consistently high pass rate over the years.

Table 217: Pass rate by Gender in WEL

WEL		2019		2021		2022	
		No.	%	No.	%	No.	%
Advanced welding	Female	7	100	4	80	9	100
	Male	21	100	84	100	125	100
Gas welding and brazing	Female	7	100	4	80	9	100
	Male	21	100	84	100	125	100
Metal work	Female	7	100	3	60	9	100
	Male	21	100	75	89.3	125	100
Shielded metal arc welding (SMAW)	Female	7	100	5	100	9	100
	Male	21	100	84	100	125	100
Technical drawing and DCG	Female	7	100	3	60	9	100
	Male	20	95.2	76	90.5	125	100
Practical WEL	Female	7	100	5	100	9	100
	Male	21	100	84	100	125	100

Table 217 indicates the performance of students in WEL related subjects based on gender across the years 2019, 2021 and 2022. Looking at the data provided, in general, it appears that male students had higher pass rates compared to female students across all subjects and all years. For example, in Advanced Welding, Gas Welding and Brazing, Metal Work, Shielded Metal Arc Welding (SMAW), Technical Drawing and DCG, and Practical WEL, the pass rate for male students was consistently at or near 100%, while the pass rate for female students

was lower. Also, we can observe some variability in pass rates across years, for both male and female students. For example, the pass rate for male students in Technical Drawing and DCG dropped slightly from 95.2% in 2021 to 90.5% in 2022. Similarly, the pass rate for female students in Metal Work dropped from 100% in 2019 to 60% in 2021, before returning to 100% in 2022.

Overall, while there are some gender differences in pass rates across subjects and years, further research would be needed to fully understand the factors contributing to these differences

Table 218: Average score, SD &VC Variation in WEL trade

WEL		2019	2021	2022
Advanced welding	Mean	60.79	76.1	73.4
	SD	10.47	11.0	13.3
	VC	17.22	14.5	18.2
Gas welding and brazing	Mean	77.57	77.0	76.2
	SD	15.50	10.8	15.9
	VC	19.98	14.1	20.9
Metal work	Mean	75.21	67.3	70.3
	SD	10.66	13.5	14.0
	VC	14.17	20.0	19.9
Shielded metal arc welding (SMAW)	Mean	74.79	82.9	86.1
	SD	14.30	10.9	10.4
	VC	19.13	13.2	12.0
Technical drawing and DCG	Mean	59.57	66.5	66.0
	SD	10.70	16.1	13.8
	VC	17.97	24.2	20.9
Practical WEL	Mean	89.64	92.9	93.9
	SD	4.63	4.1	3.4
	VC	5.16	4.5	3.6

Based on the data provided in table 2018, the performance of students in five subjects, namely Advanced welding, Gas welding and brazing, Metal work, Shielded metal arc welding (SMAW), and Technical drawing and DCG, over the years 2019, 2021, and 2022 can be analysed as follows: Here is a breakdown of the analysis by subject, using the mean score, standard deviation, and coefficient of variation (CV): For Advanced welding: The mean score increased from 60.79 in 2019 to 76.1 in 2021 and then decreased to 73.4 in 2022. The standard deviation increased from 10.47 in 2019 to 11.0 in 2021 and then further increased to 13.3 in

2022. The coefficient of variation (CV) also increased from 17.22 in 2019 to 14.5 in 2021 and then further increased to 18.2 in 2022. This indicates an increase in the variability of scores relative to the mean, which could imply a wider range of performance among students. For Gas welding and brazing: The mean score remained relatively stable over the three years, with a slight decrease from 77.57 in 2019 to 76.2 in 2022. The standard deviation fluctuated over the three years, with a significant increase in 2022 compared to 2021. The coefficient of variation (CV) also fluctuated over the years, with a slight increase in 2022 compared to 2021. This indicates some variability in performance among students but less so than in Advanced welding. For Metal work: The mean score decreased from 75.21 in 2019 to 67.3 in 2021 but then increased to 70.3 in 2022. The standard deviation increased over the years, with a significant jump from 13.5 in 2021 to 14.0 in 2022. The coefficient of variation (CV) also increased over the years, with a significant jump from 20.0 in 2021 to 19.9 in 2022. This indicates a wider range of performance among students than in Gas welding and brazing. For Shielded metal arc welding (SMAW): The mean score increased from 74.79 in 2019 to 82.9 in 2021 and then further increased to 86.1 in 2022. The standard deviation decreased from 14.30 in 2019 to 10.9 in 2021 and then slightly increased to 10.4 in 2022. The coefficient of variation (CV) also decreased from 19.13 in 2019 to 13.2 in 2021 and then slightly increased to 12.0 in 2022. This indicates a more consistent range of performance among students compared to Advanced welding and Metal work. For Technical Drawing and DCG: The mean score of Technical Drawing and DCG increased from 59.57 in 2019, to 66.5 in 2021, and slightly decreased to 66.0 in 2022. The Standard deviation (SD) of Technical Drawing and DCG increased from 10.70 in 2019, to 16.1 in 2021, and decreased to 13.8 in 2022. The Coefficient of variation (CV) of Technical Drawing and DCG increased from 17.97 in 2019, to 24.2 in 2021, and decreased to 20.9 in 2022. Practical WEL: The mean score for Practical WEL increased over the three years, from 89.64 in 2019 to 92.9 in 2021, and then to 93.9 in 2022. This indicates an overall improvement in the performance of students in this subject. The standard deviation decreased over the three years, from 4.63 in 2019 to 4.1 in 2021, and then to 3.4 in 2022. This indicates that the scores were less spread out and more tightly clustered around the mean in later years. The coefficient of variation (CV), which is the ratio of the standard deviation to the mean expressed as a percentage, decreased over the three years as well. It was 5.16 in 2019, 4.5 in 2021, and 3.6% in 2022. This suggests that the relative variability of the scores decreased over time. Overall, the data indicates that the performance of students in WEL has improved over the three years, with scores increasing, variability decreasing, and relative variability decreasing. However, it is important to note that there is a need of further research to understand the factors contributing to some differences.

Table 219: Pass rate in Welding (WEL) by school ownership

WEL		2019		2021		2022	
		No.	%	No.	%	No.	%
Advanced welding	GA			14	100.0	36	100
	PR	9	100.0	5	100.0	11	100
	PU	19	100.0	67	98.5	87	100
Gas welding and brazing	GA			14	100.0	36	100
	PR	9	100.0	5	100.0	11	100
	PU	19	100.0	67	98.5	87	100
Metal work	GA			14	100.0	36	100
	PR	9	100.0	4	80.0	11	100
	PU	19	100.0	59	86.8	87	100
Shielded metal arc welding (SMAW)	GA			14	100.0	36	100
	PR	9	100.0	5	100.0	11	100
	PU	19	100.0	68	100.0	87	100
Technical drawing and DCG	GA			14	100.0	36	100
	PR	9	100.0	5	100.0	11	100
	PU	18	94.7	58	85.3	87	100
Practical WEL	GA			14	100.0	36	100
	PR	9	100.0	5	100.0	11	100
	PU	19	100.0	68	100.0	87	100

According to the information provided in table 219, here is an analysis of the pass rate and school ownership (GA, PR, and PU) by subject over the years 2019, 2021, and 2022: Advanced Welding: In 2019, there is no data available for GA schools, but for PR and PU schools, the pass rate was 100%. In 2021 and 2022, the pass rate for all ownership types was 100%. Gas Welding and Brazing: In 2019, there is no data available for GA schools, but for PR and PU schools, the pass rate was 100%. In 2021 and 2022, the pass rate for GA and PR schools remained at 100%, while for PU schools, the pass rate dropped slightly to 98.5% in 2021 but returned to 100% in 2022. Metal Work: In 2019, there is no data available for GA schools, but for PR and PU schools, the pass rate was 100%. In 2021, the pass rate for PR schools dropped to 80%, while for PU schools, it was 86.8%. In 2022, the pass rate for all ownership types returned to 100%. Shielded Metal Arc Welding (SMAW): In 2019, there is no data available for GA schools, but for PR and PU schools, the pass rate was 100%.

In 2021 and 2022, the pass rate for all ownership types was 100%. Technical Drawing and DCG: In 2019, there are no data available for GA schools, but for PR schools,

the pass rate was 100%, while for PU schools, it was 94.7%. In 2021, the pass rate for PR schools remained at 100%, while for PU schools, it dropped to 85.3%. In 2022, the pass rate for all ownership types returned to 100%. Practical WEL: In 2019, there is no data available for GA schools, but for PR and PU schools, the pass rate was 100%. In 2021 and 2022, the pass rate for all ownership types was 100%. Overall, the pass rates for all subjects and ownership types are quite high, with most subjects achieving a 100% pass rate in 2022. The only exception was Gas Welding and Brazing for PU schools in 2021, which had a slightly lower pass rate of 98.5%.

3.5.35 Software Programming and Embedded Systems (SPE) Trade

The performance and pass rate of students in SPE trade was analysed by gender, type of school ownership. The table below presents the number of students who registered in SPE.

Table 220: Number of students who sat for SPE

Subjects	2019	2021	2022
Software Testing and Deployment (DevOps)	0	0	59
Object Oriented Programming with Java	0	0	59
Restful Services and Web Development	0	0	59
Data structures and Algorithms using C & C++ Practical	0	0	59
Applied Mathematics	0	0	52
Embedded Systems	0	0	59
Mobile Application Development	0	0	59
Software Engineering	0	0	59
English II	0	0	59
Databases Design and Development(3Ds)	0	0	59
Embedded Systems Practical	0	0	59
Develop and Maintain mobile application Practical	0	0	59
Computer Networks	0	0	59
Applied Physics	0	0	59
Data Structures and Algorithms	0	0	59
Restful Services and Web Application Development Practical	0	0	59
Advanced concepts of Programming using JAVA Practical	0	0	59

Table 220 shows the total number of students who sat for the National Exams in Software Programming and Embedded Systems (SPE) across three years, from 2019 to 2022. The data is presented in terms of the number of students who sat for the exams for specific subjects within the trade. In 2019 and 2021, there were no students who sat for the exams for any of the listed subjects. However, in 2022, there were 59 students who sat for the exams for all of the subjects. The subjects covered in the exams include software testing and deployment (DevOps), object-oriented programming with Java, restful services and web development, data structures and algorithms using C & C++ practical, applied mathematics, embedded systems, mobile application development, software engineering, English II, databases design and development (3Ds), embedded systems practical, develop and maintain mobile application practical, computer networks, applied physics, data structures and algorithms, restful services and web application development practical, and advanced concepts of programming using Java practical.

Table 221: Pass rate trend in SPE trade in Core subjects

SPE	Pass (2022)	
	No.	%
Software Testing and Deployment (DevOps)	59	100
Object Oriented Programming with Java	59	100
Restful Services and Web Development	59	100
Data structures and Algorithms using C & C++ Practical	59	100
Applied Mathematics	52	88.14
Embedded Systems	59	100
Mobile Application Development	59	100
Software Engineering	59	100
English II	59	100
Databases Design and Development(3Ds)	59	100
Embedded Systems Practical	59	100
Develop and Maintain mobile application Practical	59	100
Computer Networks	59	100
Applied Physics	59	100
Data Structures and Algorithms	59	100
Restful Services and Web Application Development Practical	59	100
Advanced concepts of Programming using JAVA Practical	59	100

Table 221 shows the results of students who has passed the subjects in SPE trade for the 2022 school year. The trade include variety of subjects such as software testing and deployment, object-oriented programming with Java, data structures and algorithms, mobile application development, computer networks, and more. The students have achieved a perfect score of 100% in most of the subject, except for Applied Mathematics, where the score is 88.14%.

It appears that the students have performed exceptionally well in their studies. The fact that the students have passed all the subjects with high scores indicates their dedication and hard work in their studies.

Table 222: Pass rate in SPE by Gender

SPE		Pass (2022)	
		No.	%
Software Testing and Deployment (DevOps)	Female	28	100
	Male	31	100
Object Oriented Programming with Java	Female	28	100
	Male	31	100
Restiful Services and Web Development	Female	28	100
	Male	31	100
Data structures and Algorithms using C & C++ Practical	Female	28	100
	Male	31	100
Applied Mathematics	Female	26	92.86
	Male	26	83.87
Embedded Systems	Female	28	100
	Male	31	100
Mobile Application Development	Female	28	100
	Male	31	100
Software Engineering	Female	28	100
	Male	31	100
English II	Female	28	100
	Male	31	100
Databases Design and Development(3Ds)	Female	28	100
	Male	31	100
Embedded Systems Practical	Female	28	100
	Male	31	100

Develop and Maintain mobile application Practical	Female	28	100
	Male	31	100
Computer Networks	Female	28	100
	Male	31	100
Applied Physics	Female	28	100
	Male	31	100
Data Structures and Algorithms	Female	28	100
	Male	31	100
Restful Services and Web Application Development Practical	Female	28	100
	Male	31	100
Advanced concepts of Programming using JAVA Practical	Female	28	100
	Male	31	100

According to the data provided in the table 223, it appears that there is no significant difference in performance between male and female students in the SPE subjects listed. Both genders achieved a 100% pass rate in all trades. However, it's worth noting that in Applied Mathematics, the pass rate for male students (83.87%) was slightly lower than that of female students (92.86%). Overall, it's encouraging to see that both male and female students performed well in these trades.

Table 223: Average score, SD& VC of students' scores in SPE

SPE	2022	
Software Testing and Deployment (DevOps)	Mean	98.6
	SD	1.6
	VC	1.6
Object Oriented Programming with Java	Mean	86.3
	SD	8.0
	VC	9.3
Restifal Services and Web Development	Mean	94.5
	SD	3.8
	VC	4.1
Data structures and Algorithms using C & C++ Practical	Mean	90.1
	SD	9.5
	VC	10.6

Applied Mathematics	Mean	32.9
	SD	16.4
	VC	49.9
Embedded Systems	Mean	97.0
	SD	2.8
	VC	2.9
Mobile Application Development	Mean	96.9
	SD	4.5
	VC	4.6
Software Engineering	Mean	93.2
	SD	5.2
	VC	5.5
English II	Mean	84.7
	SD	5.4
	VC	6.3
Databases Design and Development(3Ds)	Mean	94.6
	SD	5.9
	VC	6.2
Embedded Systems Practical	Mean	96.0
	SD	5.8
	VC	6.0
Develop and maintain mobile application Practical	Mean	92.6
	SD	6.2
	VC	6.7
Computer Networks	Mean	92.9
	SD	6.2
	VC	6.7
Applied Physics	Mean	57.1
	SD	15.4
	VC	26.9
Data Structures and Algorithms	Mean	86.2
	SD	9.0
	VC	10.5

Restful Services and Web Application Development Practical	Mean	91.4
	SD	7.6
	VC	8.3
Advanced concepts of Programming using JAVA Practical	Mean	89.1
	SD	12.9
	VC	14.5

Table 223 provides the mean, standard deviation (SD), and coefficient of variation (CV) for different subjects taken by students. Here are some observations from the table: The students performed very well in most of the subjects, with mean scores ranging from 84.7 to 98.6. The trade with the lowest mean score is Applied Mathematics (32.9), indicating poor performance in that subject. Applied Mathematics also has the highest standard deviation (SD) (16.4) and CV (49.9), indicating that the scores were highly varied among the students who took that trade.

Data Structures and Algorithms using C & C++ Practical, Applied Physics, and Advanced concepts of Programming using JAVA Practical have high coefficients of variation (CV) (10.6, 10.5, and 14.5, respectively), indicating that the scores were relatively varied compared to the mean score for these trades. Restful Services and Web Development and Databases Design and Development (3Ds) have similar mean scores (94.5 and 94.6), but Restful Services and Web Development has a smaller SD and CV, indicating that the scores were more consistent among the students who took that trade. Overall, the students seem to have performed well in most of the subjects, with some variability in scores for few subjects.

Table 224: Pass rate in SPE by school ownership

SPE		2022	
		No.	%
Software Testing and Deployment (DevOps)	PU	59	100
Object Oriented Programming with Java	PU	59	100
Restful Services and Web Development	PU	59	100
Data structures and Algorithms using C & C++ Practical	PU	59	100
Applied Mathematics	PU	52	88.14
Embedded Systems	PU	59	100
English II	PU	59	100
Databases Design and Development(3Ds)	PU	59	100
Embedded Systems Practical	PU	59	100
Develop and Maintain mobile application Practical	PU	59	100

Computer Networks	PU	59	100
Applied Physics	PU	59	100
Data Structures and Algorithms	PU	59	100
Restful Services and Web Application Development Practical	PU	59	100
Advanced concepts of Programming using JAVA Practical	PU	59	100

Examining the data above, it seems that all subjects have a pass rate of 100%, except for Applied Mathematics, which has a pass rate of 88.14%. This indicates that the majority of students who took the subjects in this trade passed them successfully. It's worth noting that pass rate alone doesn't provide information about the quality of the education provided or the difficulty level of the trades. However, having a high pass rate suggests that the trades were well-designed and that students were adequately prepared to succeed in them.

3.5.36 TVET Cross Cutting Subjects

Besides the subjects in each trade, students were examined in cross cutting subjects which include English I, Kinyarwanda, Entrepreneurship, Mathematics I, Mathematics II, Français, and Kiswahili.

Table 225: Pass rate trend in all cross cutting subjects

Cross-cutting subjects	2019		2021		2022	
	No.	%	No.	No.	%	No.
English I	13912	72.6	19159	85.67	10082	44.1
Kinyarwanda	18,700	97.38	20717	91.68	22,175	96.98
Entrepreneurship	15,923	83.24	18826	82.71	16,606	72.63
Mathematics I	7,528	66.22	11690	85.19	11,679	91.8
Mathematics II	NA	NA	NA	NA	616	99.04
Français	1,042	38.56	2450	68.59	2,449	57.69
Kiswahili	2,366	91.53	2585	73.08	986	23.57

Table 225 shows the performance trends in different cross-cutting subjects for Technical and Vocational Education and Training (TVET) students in the national examination results. The table provides data for the three years: 2019, 2021, and 2022. The first column lists the TVET subjects, which include English I, Kinyarwanda, Entrepreneurship, Mathematics I, Mathematics II, Français, and Kiswahili. The second column displays the frequency of students who passed the subject in 2019, and the corresponding percentage of students who passed the subject.

The third column shows the frequency and percentage of students who passed the subjects in 2021, and the fourth column displays the frequency and percentage of students who passed the subject in 2022. Based on the table, the pass rates for most of the subjects have fluctuated over the three years. For example, the pass rate for English I was 72.6% in 2019, increased to 85.67% in 2021, but dropped significantly to 44.1% in 2022. On the other hand, Kinyarwanda has consistently shown a high pass rate, with 97.38% of students passing in 2019, 91.68% in 2021, and 96.98% in 2022. The performance in Mathematics I improved significantly from 66.22% in 2019 to 85.19% in 2021, but then decreased slightly to 91.8% in 2022. Mathematics II was not available in 2019 and 2021, but in 2022, 99.04% of students passed the subject.

Français and Kiswahili have shown a significant increase in pass rates between 2019 and 2021. However, the pass rates for both subjects decreased in 2022, with Français dropping from 68.59% to 57.69%, and Kiswahili dropping from 73.08% to 23.57%.

Overall, the data in the table suggests that there have been fluctuations in the pass rates for different TVET subjects over the three-year period. Further analysis would be needed to determine the reasons behind these fluctuations and to identify any patterns or trends.

Table 226: Pass in cross cutting subjects by Gender

		2019		2021		2022	
		No.	%	No.	No.	No.	%
English I	Female	6,043	66.99	8455	81.89	4,306	39.49
	Male	7,870	77.49	10704	88.9	5,776	48.3
Kinyarwanda	Female	8,763	97.03	9421	90.05	10,487	96.17
	Male	9,938	97.69	11296	93.08	11,688	97.72
Entrepreneurship	Female	7,070	79	8566	80.82	7,593	69.63
	Male	8,853	87	10260	84.36	9,013	75.37
Mathematics I	Female	2,075	69	3537	89.25	3,026	93.19
	Male	5,453	65	8153	83.53	8,653	91.32
Mathematics II	Female	NA	NA	NA	NA	498	99.01
	Male	NA	NA	NA	NA	118	99.16
French	Female	668	34	1703	66.81	1,713	56.72
	Male	374	51	747	73.02	736	60.08
Kiswahili	Female	1,729	91	1,813	72.09	655	22.07
	Male	637	92	772	75.54	331	23.57

Table 226 shows how male and female students performed on various TVET disciplines in the national examination results. In English I, female students passed at a higher rate (77.49%) than male (66.99%), students in 2019, but in the following years, male students passed with a higher percentage (81.89% vs 88.9% in 2021 and 39.49% vs 48.3% in 2022). In Kinyarwanda, both male and female students had high pass rates in all years, with female students having slightly higher pass rates than male students (97.03% vs 97.69% in 2019, 90.05% vs 93.08% in 2021, and 96.17% vs 97.72% in 2022).

In Entrepreneurship, the female students had a higher pass rate than male students in 2019 (79% vs 87%), but in the following years, male students had a higher pass rate (80.82% vs 84.36% in 2021 and 69.63% vs 75.37% in 2022). In Mathematics I, the female students had a lower pass rate than male students in 2019 (69% vs 65%), but in the years that followed, female students had a higher pass rate than male students (89.25% vs 83.53% in 2021 and 93.19% vs 91.32% in 2022). In Mathematics II, there is no data for the pass rate of either male or female students. In Français, female students had a lower pass rate than male students in 2019 (34% vs 51%), but in the years that followed, female students had a higher pass rate than male students (66.81% vs 73.02% in 2021 and 56.72% vs 60.08% in 2022). In Kiswahili, female students had a higher pass rate than male students in 2019 (91% vs 92%), but in the years that followed, female students had a lower pass rate than male students (72.09% vs 75.54% in 2021 and 22.07% vs 23.57% in 2022).

Overall, we can observe that there are variations in the pass rates of male and female students in different TVET subjects, and these variations change from year to year. It is important to note that these numbers alone do not necessarily indicate whether there are gender disparities in educational outcomes, as other factors such as socioeconomic status, access to education, and cultural norms could also play a role.

Table 227: Average score, SD & VC of scores in all cross cutting subjects

All Trades		2019	2021	2022
English I	Mean	48.90	47.06	37.85
	SD	15.57	13.79	15.88
	VC	31.83	29.30	41.97
Kinyarwanda	Mean	65.27	70.76	64.78
	SD	12.41	11.18	12.14
	VC	19.02	15.80	18.74
Entrepreneurship	Mean	53.29	59.01	51.09
	SD	22.35	19.75	19.08
	VC	41.92	33.47	37.35

Mathematics I	Mean	30.60	46.12	45.09
	SD	19.76	19.80	19.53
	VC	64.57	42.94	43.32
Mathematics II	Mean	NA	NA	56.64
	SD	NA	NA	17.15
	VC	NA	NA	30.28
Français	Mean	20.86	29.15	45.28
	SD	16.17	15.28	17.37
	VC	77.51	52.41	38.36
Kiswahili	Mean	41.75	32.11	28.05
	SD	16.71	17.62	17.39
	VC	40.02	54.86	62.00

Table 227 provides the descriptive statistics for the variation coefficient (VC), standard deviation (SD), and mean scores in different TVET subjects for three consecutive years (2019, 2021, and 2022) in Rwanda's national examination results. The variation coefficient is a measure of the dispersion of data, and a lower coefficient indicates less variability in scores. The standard deviation measures the spread of scores around the mean, and a lower standard deviation indicates more consistent scores. In English I, the VC increased from 31.83% in 2019 to 41.97% in 2022, indicating an increase in variability among students' scores. In Kinyarwanda, the VC decreased from 19.02% in 2019 to 18.74% in 2022, indicating a more consistent performance among students. Entrepreneurship had the highest VC in all three years, indicating a significant variability in scores among students, with a decrease from 41.92% in 2019 to 37.35% in 2022. Mathematics I had the highest VC in 2019 (64.57%) but showed a decrease to 43.32% in 2022, indicating less variability in students' scores over the years. Mathematics II and Kiswahili scores were not reported in 2019 and 2021. In 2022, Mathematics II had a moderate VC (30.28%), while Kiswahili had a high VC (62.00%). In terms of mean scores, Kinyarwanda consistently had the highest mean score in all three years, while English I had the lowest. There was an increase in the mean scores for Mathematics I and French from 2019 to 2022. Overall, this table provides insight into the performance and variability of scores among students in different TVET subjects in Rwanda's national examination results.

Table 228: Pass rate in crosscutting subjects by school ownership

Cross cutting subjects		2019		2021		2022	
		No.	%	No.	%	No.	%
English I	GA	2,957	88.45	3,969	95.8	2,016	60.98
	PR	6,864	63.47	9,422	80	4,539	37.01
	PU	3,695	89.88	4,559	93.92	2,869	56.59
Kinyarwanda	GA	3,334	99.73	4,080	98.98	3,289	99.49
	PR	10,465	96.69	10,640	89.36	11,930	97.28
	PU	4,115	99.59	4,857	98.7	4,951	97.63
Entrepreneurship	GA	3,204	95.84	4,069	96.06	3,088	93.41
	PR	8,301	76.76	9,156	76.83	8,254	67.3
	PU	3,882	95.47	4,670	94.17	4,261	84.03
Mathematics I	GA	1,725	83	2,966	96.17	2,161	98.14
	PR	3,716	56.47	5,731	77.75	6,675	89.57
	PU	2,073	78.79	2,903	93.71	2,660	97.19
Mathematics II	GA	NA	NA	NA	NA	239	98.76
	PR	NA	NA	NA	NA	149	99.33
	PU	NA	NA	NA	NA	227	99.13
Français	GA	123	93	202	99.02	174	91.1
	PR	554	28	1,394	61.09	1,422	56.27
	PU	170	70	210	90.52	318	66.95
Kiswahili	GA	129	97.73	190	95.96	98	55.37
	PR	1,745	91.75	1,992	71.4	598	24.12
	PU	200	100	230	93.88	144	30.32

Table 228 shows the performance of students in various TVET subjects in the national examination results, based on school ownership: Government Aided (GA), Private (PR), and Public (PU). The table presents the frequency and percentage of students who passed the exam in three consecutive years: 2019, 2021, and 2022.

In English I, the highest pass rate was observed in the GA schools in 2019 (88.45%), which dropped to 60.98% in 2022. In contrast, the pass rate in PR schools increased from 63.47% in 2019 to 80% in 2021, but then decreased to 37.01% in 2022. The pass rate in PU schools was consistently high, ranging from 89.88% in 2019 to 93.92% in 2021, but dropped to 56.59% in 2022. In Kinyarwanda, the pass rate was consistently high across all school ownership categories and years, ranging from 96.69% to 99.73% in GA schools, 89.36% to 97.28% in PR schools, and 98.7% to 99.59% in PU

schools. In Entrepreneurship, the pass rate was also consistently high in GA and PU schools, ranging from 93.41% to 95.84% and 84.03% to 95.47%, respectively, but lower in PR schools, ranging from 67.3% to 76.83%. In Mathematics I, the pass rate increased in all school ownership categories and years, with the highest pass rate observed in GA schools in 2022 (98.14%). The pass rate in PR schools also increased, from 56.47% in 2019 to 89.57% in 2022, while the pass rate in PU schools remained consistently high, ranging from 78.79% to 97.19%. In Mathematics II, there is no data available for GA and PR schools, but the pass rate in PU schools was consistently high, ranging from 99.13% to 99.33%. In French, the pass rate was highest in GA schools in 2019 (93%) and then increased to 99.02% in 2021, but then decreased to 91.1% in 2022. The pass rate in PR schools increased from 28% in 2019 to 61.09% in 2021, but then decreased to 56.27% in 2022. The pass rate in PU schools was highest in 2022 (66.95%). In Kiswahili, the pass rate was highest in GA and PU schools, ranging from 55.37% to 100% and 30.32% to 93.88%, respectively. However, the pass rate in PR schools decreased from 91.75% in 2019 to 24.12% in 2022.

Overall, the table shows variations in the performance of TVET subjects across different school ownership categories and years. It suggests that while some schools consistently perform well in certain subject. According to chief marker's report and the outcome of discussion with focused group of teachers, possible reasons for candidates' low performance include language barrier, lack of sufficient teaching and learning materials, family conflicts, Lack of prerequisite in some subjects, Students' indiscipline, mismatch between taught content and levels of candidates, lack of students' interest in some subjects like French, confusing questions and instructions in the National examinations as well as questions that require higher-order of thinking.

However, all these observations should be closely investigated to confirm whether they constitute the real reason behind this performance trend.

SECTION FOUR: CONCLUSION AND RECOMMENDATION

This section provides conclusions and suggests recommendations based on the findings of the analysis of the national examinations for the three school years (2019, 2021 and 2022).

Conclusions

In conclusion, there was a progressive improvement in performance in national examinations for primary, O-level, A-level, Teacher training colleagues as well as TVET trades over the three years. In fact, in 2022, the general pass rates of students in exams at all levels were significantly higher compared to 2019 and 2021. The implication is that the new grading system had no impact on student failing or passing. Despite the progressive improvement in general performance at different levels, as earlier mentioned, in some subjects and trades, the performance was poor and there were variations, especially pertaining to location (rural-urban), ownership of school (public, district, private and government aid) and gender. Based on the findings of the analysis, the following recommendations are made:

Recommendations

Based on the findings of the analysis, the following recommendations are made:

- The analysis of national examinations results for each learning cycle elicited pertinent information regarding pass rate and student performance in specific subjects. We recommend that NESAC should have a long-term plan for adopting and implementing this practice every year.
- We recommend that in future, NESAC should plan so that in future, end term III exam results are also analysed and comparison made with national exam results to provide a clear picture of student performance. It can also help teachers to evaluate the effectiveness of their teaching strategies.
- Despite the progressive improvement in general performance at different levels, as earlier mentioned, in some subjects and trades, the performance was poor and there were variations, especially pertaining to location (rural-urban), ownership of school (public, district, private and government aid) and gender. It is therefore, recommended that NESAC, in collaboration with partners should conduct a comprehensive study to identify the factors that have contributed to disparities in performance by location, gender, district

and school ownership. The findings of the study could serve as the basis for development of evidence-based strategies that can enhance the quality of teaching and learning thereby addressing disparities between provinces, rural and urban schools. The study can also unveil best practices in high-performing districts and schools that can be adopted and implemented by those that perform poorly.

- Dissemination of the report of national examination analysis using different channels such as the NESA website and e-platform, media, and meetings with partners/stakeholders.

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The Rwanda statistical yearbook 2019 & 2021

Rwanda Ministerial Order on national examination guidelines

Presidential Order N° 121/01 of 15/10/2020 establishing national examination and school Inspection Authority

ANNEXES

Annex 1

A standardized grading system used in national examinations from 2007 to 2021.

Achievement level	Achievement description	Percentage Score ranges	Grades (Primary & O-level)	Letter grades A-level	Values for letter (A-level) grades
1	Outstanding	75– 100	Distinction1(D1)	A	A= 6
2	Excellent	70 – 74	Distinction2 (D2)		
3	Very good	65 – 69	Credit 3 (C3)	B	B =5
4	Good	60 – 64	Credit 4 (C4)	C	C =4
5	Satisfactory	55 – 59	Credit 5 (C5)	D	D =3
6	Adequate	50 – 54	Credit 6 (C6)	E	E = 2
7	Moderate	45 – 49	Pass 7 (P7)	S	S = 1
8	Fair	40 – 44	Pass 8 (P8)		S = 1
9	Unclassified	0 – 39	Fail (F9)	U	0

Annex 2

A standardized grading system used in national examinations in 2022

Description	Range	Grade Letter	Grade Value
Excellent	70 – 100	A	6
Very good	65 – 69	B	5
Good	60 – 64	C	4
Satisfactory	50 – 59	D	3
Adequate	40 – 49	E	2
Fair	20 – 39	S	1
Fail	0 – 19	F	0

Annex 3

SUMMARY OF CHIEF EXAMINERS REPORT BY SUBJECT

Candidate's general performance/Advice to offer to Schools

- Provide many tasks to learners and use different tests for students/ candidates preparing for national exams;
- Creating a good environment for studies, and innovation by involving learners in the life of schools; teaching parents about quick home solutions
- Provision of learning materials.
- Covering the content (Syllabus) in time /Schools emphasize syllabus completion on time and cover all planned units; the emphasis should be put on covering all the syllabi and proper use of English in schools.
- Giving learners enough practice questions
- Setting tests based on all levels of bloom's taxonomy
- Teaching the four skills in English and enhancing speaking skill practice/ culture
- Collaboration between schools and parents
- Provide teaching aids and motivation
- Avail more training on practical and demonstration lessons to teachers in schools;
- Give more evaluations and exercises to learners
- Emphasis should be put on covering all the syllabus and proper use of English in schools.
- The teaching materials of chemistry are still needed and focus on experiments if possible
- Encourage learners to carry out more research;
- Emphasize the proper discipline of learners.
- To equip schools with enough teaching materials in the English language
- To continue motivating students to attend the classes;
- To monitor teachers' activities;
- To give equal value to all examinable subjects.
- School administrators should immediately report any gap among teachers to the concerned authorities;
- To motivate and train teachers.
- Schools should encourage learners to read and use English in their day-to-day activities.

- Organize different practical to put theory into practice
- Many practical exercises for candidates
- To supervise teachers
- To check if all units are covered
- Continuously assess learners following the levels of Bloom's taxonomy to test and instill learners' abilities
- Provide many tasks to learners
- Use different tests for Y3 students for preparing them for the national exam
- Avail French books in the libraries and encourage students to read books/novels
- Organizing training for French teachers
- To cover the whole content of the curriculum
- To provide all necessary teaching-learning materials
- To motivate both candidates and their teachers.
- Providing all necessary materials (books, films, audio of literary documents)
- Improve the English language at the ordinary level
- Keeping on preparing well the learners through the teaching and learning process
- Schools should improve language skills in order to respond to and understand asked questions
- Improve languages skills
- Allocate budget related to practical materials
- Teachers should try to cover the syllabus in time
- Candidates should be prepared ahead of time (from S4 TO S6)
- Teachers should be given teaching materials that are in uniform form and they should be given chance to participate in books writing;
- Schools should organize seminars and discussions among history teachers on a sector/district basis to equip teachers with modern teaching skills
- Teachers should be given teaching materials that are in uniform form and they should be given the chance
- Schools should organize seminars and discussions among history teachers on a sector/district basis to equip teachers with modern teaching skills
- Schools should organize seminars and discussions among history teachers on a sector/district basis to equip teachers with modern teaching skills

- To help learners to understand effectively the whole program through Teaching Learning process
- Organize formative and summative assessments before passing the national examination.
- Teachers have to cover the content effectively
- To provide enough time for students and teachers to carry out revision of all content covered
- Provide many tasks to learners and use different tests for year 3 students for preparing them for national exams;
- Creating a good environment for studies, and innovation by involving learners in the life of schools;
- Teaching parents about quick home solutions;
- Covering the content (Syllabus) in time;
- Giving learners enough practice questions and
- Setting tests based on all levels of bloom's taxonomy
- Avail more training on practical and demonstration lessons to teachers in schools;
- Schools should cover the syllabus;
- Encourage learners to carry out more research;
- Give enough evaluation exercises;
- Emphasize the proper discipline of learners.
- Teachers should be given teaching materials that are in uniform form and they should be given chance to participate in books writing;
- Schools should organize seminars and discussions among history teachers on a sector/district basis to equip teachers with modern teaching skills;
- To use learner-centered pedagogy and make sure that they cover the expected contents;
- Improve languages skills
- Allocate budget related to practical materials
- Organize formative and summative assessments before passing the national examination;
- To let students, have access to questions bank of economics openly;
- To use learner-centered pedagogy and make sure that they cover the expected contents

Factors that contribute to the performance of students

- Internal systems (Classroom size, drop up and language barrier, etc.)
- The language barrier and lack of teaching materials
- Not having covered the content in time and having fewer revision exercises
- Indiscipline of learners, automatic promotion; Irregular attendance of learners,
- Low follow-up of parents;
- overcrowded classrooms;
- Insufficient teaching aids
- The performance could be attributed to curriculum designers because the content given to learners, does not match their level of understanding
- This is due to having set a wide range of topics, which favors the learners. Again learners are getting more conversant with the language of instruction
- The performance is attributed to the proper setting of the paper and was within the limits and requirements of the syllabus.
- Learners got enough time to prepare and cover the syllabus due to the COVID-19 school break-off
- We contribute to assure that the performance is in relation to the quality of the examination
- Learners were not used to this mode of questioning and even instruction misguided item
- All stakeholders in teaching have provided an effort in encouraging students to work hard
- Language understanding used in testing
- Some students do not study well back in their school
- The performance is attributed to the fact that the paper was set according to the Competence-based curriculum
- The performance comes (based on) the form the hardworking of both teachers and learners and the policy of the government
- Good education policies and distribution of learning materials
- Good collaboration between teachers, learners, and parents
- This performance is attributed to how the exam was more theoretical than practical
- The low performance is due to the paper is out of the syllabus

- The way the paper was set affected the performance (The exam was completely changed with two sections where section A was compulsory.)
- Questions reflect the content of the curriculum syllabus and were on the level of learners
- Changes that were made in the setting of the examination contributed a lot to this performance
- Performance (about 60% got under 50%)
- The syllabus is new and big compared to the time allocated

Annex 4

CONSISTANCE IN PERFORMANCE OF SCHOOLS

Annex 4.1. Ranking of 50 Best-performing Primary Schools

Schools	Rank 2019	Rank 2021	Rank 2022
DRE271	1	8	10
AZA270	2	4	15
nir571	3	3	8
ARS571	4	6	4
AKA130	5	14	101
MBO411	6	107	48
ACE120	7	9	21
ICE110	8	7	19
OOL571	9	12	23
ERA310	10	11	37
ARE240	11	20	12
aka130	12	16	80
ONE430	13	13	13
aul130	14	10	16
EMY131	15	19	28
RRA240	16	54	17
LES560	17	66	41
OLL421	18	24	45

Annex 4.2. Ranking of 50 Poorly-performing Primary Schools

Schools	Rank 2019	Rank 2021	Rank 2022
EYA451	2768	3067	2847
IRA330	2769	3225	1243
NGI350	2770	3254	2474
AZI270	2771	2316	2612
ATH281	2772	3029	2747
NGO330	2773	3169	3320
UFE320	2774	1927	3384
ARA351	2775	3092	3108
NGA370	2776	2758	2310
NDA311	2777	2565	3522
EGE251	2778	3052	3349
ARA210	2779	2744	1821
INI421	2780	2444	1149
STE271	2781	2782	1799
URA370	2782	3217	2932
ERO271	2783	2396	3401
ORO230	2784	1297	2236
NGE421	2785	1113	2159

EMY340	19	26	135
OOL120	20	45	78
API240	21	44	6
ARY130	22	38	113
era440	23	36	262
ZON121	24	30	38
AND571	25	1	7
EMY130	26	76	143
RCO131	27	72	29
bes571	28	281	250
nga131	29	41	118
HTS121	30	59	145
ERE120	31	48	79
ANA510	33	123	122
TRE570	34	65	85
EMY121	35	198	99
ool121	36	29	70
avu330	37	100	244
RES571	38	17	14
ool130	40	85	91
DOM430	41	23	22
emy531	42	51	114
OOL121	43	42	144
NDO241	44	15	51
LES560	45	39	30
GES121	46	149	195
EKA130	47	112	102
eau421	48	68	124
nja421	49	68	124
OOL540	50	243	231
NDA121	51	84	54

OZI350	2786	2751	2235
IRO350	2787	3194	1791
MBI331	2788	2646	3208
ABA411	2789	3204	1677
MBO240	2790	1694	1506
AYI350	2791	2296	2377
INA351	2792	2170	3192
AGE350	2793	3080	3334
ANO320	2794	2512	2752
EGA310	2795	3164	3438
AYO410	2796	3063	3415
OKO361	2798	1621	1095
II220	2799	1905	1490
URA350	2800	2803	3468
UKI330	2801	3161	3142
AMA350	2802	2256	1887
MBA310	2803	2521	2967
EHE410	2804	2995	2331
ARA320	2805	2616	3452
ABA350	2807	2963	3342
NGO270	2808	3280	3555
NDA350	2809	2840	3071
ARO270	2810	3222	3034
NDA321	2811	2984	3523
ACA320	2812	2235	3033
AZI421	2813	1779	1491
UYE320	2814	3320	3516
OTI321	2815	3277	3395
ITA571	2816	3257	3552
IMA330	2817	3218	3500
IZA321	2818	3155	3376

Annex4.3 Ranking of 50 best-performing Schools in Ordinary level

School	Rank 2019	Rank 2021	Rank 2022
ol0102F15	1	2	1
ra0102P63	2	3	6
ux0101L31	3	5	4
ro0205P55	4	1	2
da0204E11	5	4	7
OL0507M54	6	7	5
na0206E30	7	6	9
BO0405E39	8	11	12
ys0306P63	9	8	20
na0206G31	10	13	17
za0201C30	11	16	3
yi0207P61	12	12	11
gi0401E32	13	17	36
ro0405P57	14	18	22
ba0405G33	15	26	29
ke0307E35	16	9	21
ba0404P54	17	15	10
ie0301C30	18	30	31
ni0504F20	19	32	19
do0303P61	20	20	26
re0204G18	21	14	18
ma0306E10	22	49	61
OL0102S83	23	25	33
ja0402G32	24	24	27
za0403G37	25	27	35
ze0403E30	26	10	15
gi0307E42	27	39	60
li0101L13	28	36	40
OL0504N57	29	22	69

Annex 4.4 Ranking of 50 poorly-performing Schools in Ordinary level

School	Rank 2019	Rank 2021	Rank 2022
vu0506E52	1328	1415	1387
RA0305G19	1329	1294	1721
GA0405G55	1329	1357	1685
DU0503G14	1330	1132	1002
MU0303G19	1331	1374	1220
ZE0403G26	1332	1393	1260
sa0506G21	1333	1155	691
GO0207G13	1334	1184	1619
BI0505G38	1335	1014	815
GA0402G38	1336	1235	752
YU0305G28	1337	1335	1711
IC0503G03	1338	1065	1431
DO0302G06	1339	1452	1372
RA0401G08	1340	1398	1413
GO0307G51	1341	740	1074
RO0207G05	1342	773	1535
KO0302G36	1343	1426	1739
WE0203G33	1344	273	340
IM0201G09	1345	1151	1014
GO0505G07	1346	1409	1291
BA0203G20	1347	1407	1555
MU0307G05	1348	1353	1620
MO0505G19	1349	1361	990
HI0402G03	1350	1424	1796
UE0304G08	1351	1410	1743
BA0202G01	1352	877	1171
DA0401G20	1353	1459	1304
UE0304G15	1354	1217	1727
BE0305G40	1355	1346	1063

zo0307E12	30	75	137
da0204P58	31	21	13
ré0101G30	32	19	16
ma0103E10	33	33	24
OL0507M56	34	81	45
ba0402G36	36	31	58
ba0305C34	37	43	41
na0501G34	38	50	79
za0506P54	40	35	39
ma0208G31	41	124	92
za0403E31	42	45	42
ve0202G35	43	34	34
yi0207G35	44	41	78
go0401E18	45	46	23
li0401E15	46	120	51
SS0502M51	47	69	47
be0103E11	48	80	80
ra0307G43	49	86	56
ke0307G45	50	51	54

YO0405G10	1356	1082	523
WA0304G06	1357	1438	1794
DO0401G55	1358	1416	675
en0303C53	1359	1445	1798
GA0307G03	1360	1402	1538
BA0302G26	1361	1442	1482
HE0303G01	1362	1360	1627
DA0304G04	1363	1427	1736
ZA0506G19	1364	1399	1587
RO0203G21	1365	1467	1732
IG0303E57	1366	1457	1791
MA0307G25	1367	1313	1643
A0506G27	1368	1414	1633
RA0506G24	1369	1328	1522
LI0405G58	1370	1228	1753
na0302E10	1371	1435	1416
GU0402E31	1372	1463	664
WA0402G26	1373	775	1699
NI0207G24	1374	794	389
VU0303G13	1375	1465	1795
HA0304G17	1376	1464	1800

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