GHANA EDUCATION SERVICE (GES)

TRANSFORMING TEACHING, EDUCATION AND LEARNING

SECONDARY EDUCATION TRANSFORMATION PROGRAMME (SETP)

2023 SURVEY REPORT

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Acronyms and Abbreviations

BECE	Basic Education Certificate Examination
FGD	Focus group discussions
GES	Ghana Education Service
GESI	Gender equality and social inclusion
ICT	Information and communication technologies
IT	Information technology
JHS	Junior high school
KMO	Kaiser-Mayer-Olkin
NaCCA	National Council for Curriculum and Assessment
NPLAF	National Pre-tertiary Learning Assessment Framework
NTC	National Teaching Council
NTS	National Teachers' Standards
PLC	
SEN	Special education needs
SETP	Secondary Education Transformation Programme
SHS	Senior high school
SHTS	Senior high technical school
SIP	School improvement plan
SISO	Schools improvement support officers
SPPP	School partnership performance plan
TLMs	Teaching and learning materials
T-SHEL	Transforming Senior High School Education, Teaching and Learning
T-TEL	Transforming Teaching, Education and Learning
WASSCE	West African Senior Secondary Certificate Examination

Executive summary

This research study generates evidence on whether change is happening in the Secondary Education Transformation Programme (SETP) schools as a result of the interventions implemented by the Ministry of Education (MoE) and the Ghana Education Service (GES), with financial and technical support from Transforming Teaching, Education and Learning (T-TEL) through the Mastercard Foundation.

A mixed method approach was adopted for the study. For both 2022 and 2023, lessons of teachers were observed with follow up interviews. Students were assessed in reading, mathematics and science literacy as well as 21st century skills. Additionally, qualitative data were collected from school leaders, parents and opinion leaders.

The results of the student assessment showed that slightly less than 29 percent of students, on average, across the SETP schools were approaching proficiency or higher in reading literacy in 2023. Approaching proficiency is the benchmark in reading literacy. At this level students can identify the main idea in text of moderate length. They can understand relationships or construe meaning within a limited part of the text when the information is not prominent by producing basic inferences, and/or when the text(s) include some distracting information. The result further showed that 14 percent of the students were top performers in reading literacy in 2023 (proficient and above) compared with 3.9 percent in 2022

In mathematics literacy, there were marginal increases in the 2023 result compared with 2022. On average, about one-third of the SETP students were approaching proficiency or higher in mathematics literacy in 2023, up from about 30 percent in 2022. At the minimum, these students can execute clearly described procedures, including those that require sequential decisions. Their interpretations are sufficiently sound to be a base for building a simple model or for selecting and applying simple problem-solving strategies. Second-year students outperformed third-year students in 2023. The mathematics teachers from SETP ascribed this issue to disciplinary problems, specifically the absenteeism of third-year students.

Also, about 40 percent of the SETP students were approaching proficiency in science literacy in 2023. The 2023 result is significantly higher than the 2022 result. At the minimum, students approaching proficiency can draw on moderately complex content knowledge to identify or construct explanations of familiar phenomena. In less familiar or more complex situations, these students can construct explanations with relevant cueing or support. There was a significant increase in the top performers (highly proficient and proficient only), from 5 percent in 2022 to 20 percent in 2023. As in the other areas, 'developing' and 'emerging' categories declined, suggesting positive progress as students moved to higher proficiency levels.

The performance of students in 21st century skills changed significantly in 2023. Overall, 13.7 percent of students demonstrated proficiency (the “minimum level of proficiency”) or higher in 21st century skills in 2023 compared with 3.4 percent in 2022. At the minimum, these students can provide descriptions of situations that are less familiar or require deeper reasoning, such as ones that require causal reasoning.

The SETP surveys measured teachers’ motivation and their desire to remain in the teaching profession till they reach their retirement age. The survey asked SETP teachers to self-rate whether they agree or disagree (five-point Likert scale) with questions relating to their motivation.

On teacher motivation, the results show no significant difference between the 2022 and 2023. Twelve percent of the teachers were motivated to teach in 2023 compared with 11.5 percent in 2022. Significantly more older teachers (52.8 percent) are willing to remain in the teaching profession compared with younger teachers (45.3 percent). Also, teachers with many more years of experience (55.8 percent) are willing to remain compared with teachers with less experience (39.5 percent). The 2023 result showed that nearly 9 of 10 teachers agreed that their salaries is not sufficient for their

needs. This result is similar to that of 2022. Also, less than a fifth of the teachers indicated that they do not get paid on time, which is also similar to the 2022 results.

Lessons of 180 teachers were observed in the 12 SETP schools. The result indicates that while in 2022, none of the SETP teachers were observed to excellently demonstrate the application of the NTS, this situation improved significantly in 2023 as two in every ten SETP school teachers were excellently demonstrating the use of the NTS in their lessons.

Also, in 2022, while none of the SETP teachers were observed to use ICT and digital technologies excellently in their lessons, the 2023 result shows a significant shift with one in every ten SETP school teachers ~~is~~ excellently integrating ICT and digital technologies in their lessons.

Finally, the percentage of teachers using GESI-responsive pedagogy increased significantly from 0 percent in 2022 to 16 percent in 2023.

Interviews, document reviews and spot checks by the researchers revealed that 8 out of the 12 SETP school leaders (including boards and senior management) were found to excellently demonstrate an excellent understanding of their roles and responsibilities in 2023 compared with 1 out of 12 in 2022. Also, 7 out of the 12 SETP school leaders ensured an inclusive, gender-sensitive environment for their staff and students in 2023, an increase from 2 out of 12 schools in 2022.

The above results are summarised in table 1.0 below.

The research findings have implication for policy and practice on secondary education. The study's findings on absenteeism highlight the need for stricter disciplinary and attendance policies in secondary schools. Secondary schools should consider implementing robust monitoring systems to track student attendance, while teachers and school leaders need to engage more with students and their parents to address the root causes of absenteeism.

Concerning teacher motivation, it is clear from the 12 SETP schools that policies aimed at improving the welfare of teachers are urgently needed. This might include salary reviews and timely payment of wages. The upcoming study on teacher motivation will shed more light on this.

Although the study was carried out in 12 secondary schools, it has implication for scaling up some of its key principles – including intervention in reading, PLC, involvement of school leadership, teaching and learning, and guidance and counselling, especially since all categories of SHS and SHTS were represented in the study. The scaling should consider the particular context of the schools.

Table 1.0 Summary of key results

	Indicator	Survey 2022	Survey 2023
SETP Students	Percentage of secondary education students by grade who demonstrate subject knowledge and 21st century skills.	Subject knowledge: Reading literacy (12.2 percent of students are approaching proficiency and or above), Mathematics literacy (30.0 percent of students are approaching proficiency and or above) and Science literacy (16.3 percent of students are approaching proficiency and or above) 21st century skills (3.4 percent are proficient and or above)	Subject knowledge: Reading literacy (28.9 percent of students are approaching proficiency or above), Mathematics literacy (32.3 percent of students are approaching proficiency or above) and Science literacy (40.8 percent of students are approaching proficiency or above) 21st century skills (13.7 percent are proficient or above)
Teachers	Percentage of SETP teachers displaying core competencies in the National Teachers' Standards (NTS).	0 percent	19.4 percent
	Percentage of SETP teachers using digital technology to enhance their teaching.	0 percent	10.6 percent
	Percentage of SETP teachers demonstrating GESI- responsive pedagogy.	0 percent	16.1 percent
	Percentage of SETP teachers who are motivated and want to remain in the profession.	Teachers who are motivated (11.5 percent) Teachers who want to remain in the teaching profession (49.8 percent)	Teachers who are motivated (12.4 percent) Teachers who want to remain in the teaching profession (49.4 percent)
SETP schools	Percentage of secondary schools with an inclusive, gender-sensitive environment for staff and students.	Two of the 12 SETP schools have an inclusive gender-sensitive environment for staff and students.	Seven of the 12 SETP schools have an inclusive gender-sensitive environment for staff and students.
	Percentage of boards and senior management teams of secondary schools that demonstrate understanding of their roles and responsibilities	One of the 12 SETP schools have boards and senior management teams that demonstrate an understanding of their roles and responsibilities.	Eight of the 12 SETP schools have boards and senior management teams that demonstrate an understanding of their roles and responsibilities.

1. INTRODUCTION

1.1 Background to the SETP programme

The Ministry of Education (MoE) and the Ghana Education Service (GES), with financial and technical support from Transforming Teaching, Education and Learning (T-TEL) through the Mastercard Foundation, are currently working with 12 senior high schools (SHS) and senior high technical schools (SHTS) to bring about improvements in performance and learning outcomes through the Secondary Education Transformation Programme (SETP).

SETP is based on the Ministry of Education's decision in 2021 to pilot some of the approaches incorporated in its Secondary Education Strategy in a sample of SHSs and SHTSs. Forty-seven schools were identified[1] and invited to submit applications to participate in SETP. Thirty-three schools submitted applications. GES evaluated the applications and recommended that 12 schools be included in the programme (see table 1.1).

Table 1.1 SETP schools sampled

Schools	Region	Category*
Lambussie Community Day SHS	Upper West	C
Nabango Community SHS	Upper East	C
Bolgatanga SHS	Upper East	A
Gambaga Girls SHS	North East	C
Walewale Vocational/Technical	North East	C
Zabzugu SHS	Northern	C
E.P. Agriculture, Tatale	Northern	C
Ziavi Community SHTS	Volta	C
Ogyeedom Community SHTS	Central	C
Benso SHTS	Western	B
Bosome SHTS	Ashanti	B
Mangoase SHS	Eastern	C

* GES categorises schools based on their infrastructure and performance on the West African Senior School Certificate Examination (WASSCE). Category A schools are deemed to be the best, followed by schools in categories B and C. Among the 47 schools first identified as underperforming, 36 were in category C, followed by 7 in Category B, and 4 in category A. Mangoase SHS and Bosome SHTS were not among the 47 but are included in SETP to ensure geographic coverage. For the same reason Benso SHTS, which had submitted an unsuccessful application, was also included.

SETP is based on the principle that SHSs, SHTS and the stakeholders involved in their management, operations and governance are best able to understand the issues inhibiting student scholastic attainment within their schools and that, with support and facilitation, they can take the lead in owning and developing solutions to their challenges.

SETP's overall aim is to ensure that students in the 12 schools are equipped with relevant skills and competencies to progress and succeed in further studies, the world of work, and adult life.

[1] based on their performance in the West African Senior School Certificate Examination (WASSCE). These schools recorded low WASSCE results over a three-year period (2017 to 2020).

SETP's interventions are guided by the eight thematic focus areas in the Secondary Education Strategy:

- Leadership and management
- Curriculum and assessment with structured interventions
- Professional development, teaching and learning
- Learning environment and infrastructure
- Guidance and counselling
- Gender equality and social inclusion (GESI)
- Stakeholder partnerships and community engagement
- Monitoring, evaluation and accountability

The MoE, GES and T-TEL worked with the 12 schools to develop school improvement plans (SIPs) to cover the eight thematic areas. Each plan contains four to five objectives, The first two objectives are the same for all schools and are:

- To improve the quality of leadership and management through the provision of structured and accredited leadership training for School Management and School Boards.
- To improve the quality and relevance of teaching and learning through the introduction of regular, structured professional learning community (PLC) sessions for all teachers.

Additional objectives varied per school, reflecting their unique circumstances and community feedback. Schools shared common objectives, such as improving student and teacher discipline, strengthening guidance and counselling, enhancing teaching and learning resources, institutionalising awards schemes to motivate all school stakeholders, improving the effectiveness of school supervision and monitoring, supporting students' reading and writing skills, and enhancing school-community collaborations. Some schools also focused on improving facilities, ensuring a secure learning environment, promoting parental involvement in their children's education, and improving water supply systems.

SETP have been running for the past 14 months and key interventions included leadership training, weekly professional learning community (PLC) sessions[2], the introduction of awards schemes, the establishment of school supervision and monitoring teams, and the organisation of remedial classes to develop student literacy skills. Schools also addressed discipline, guidance, and counselling issues and upgraded their teaching resources and equipment. Some schools implemented measures to provide a safer learning environment, increased parental involvement, and renovated existing facilities.

1.2 Rationale and purpose of the endline study

The objectives of the survey are:

1. Provide data to demonstrate the changes in the SETP schools as a result of the implementation of the SETP interventions
2. Provide qualitative insights and explanations as to why the desired changes have or have not occurred; and,
3. Produce robust evidence that can inform policy and practice aimed at driving improvements in Ghana's secondary education institutions.

[2] PLC sessions are dedicated periods in the school's weekly schedule where all teachers come together and work collaboratively to improve teaching and learning. PLC sessions will help teachers to build a collective understanding of how to improve outcomes for all learners in their schools through a series of practical activities such as lesson study, team teaching, and action research.

1.2 Rationale and purpose of the endline study

1.2.1 Rationale

Secondary schools in Ghana particularly the SETP schools are not preparing students to succeed in further studies, the world of work and adult life. From 2017 to 2020, their performance in the WASSCE has raised concerns among parents, teachers, and policy makers. Through MoE's decision, 12 schools were selected to participate in a pilot intervention programme based on the key principles in the Secondary Education Strategy and Policy. In 2022, a survey study was carried out to identify the performance of the students in reading literacy, mathematics literacy, science literacy, and knowledge and application of 21st century skills and competencies in addition to the collection of qualitative data to offer explanation for observed impact. The results provided a baseline that depicted the status of students' performance in these four areas. It became necessary to conduct an endline study in 2023 to determine the impact of the intervention on performance in these areas.

1.2.2 Purpose

To identify the impact of the interventions in the SETP schools on the academic performance of their students and the quality of teaching.

1.2.3 Objectives

The objectives of the survey were to:

- Determine the performance of students in SETP schools in reading literacy, mathematics literacy, science literacy, and 21st century skills as a result of the intervention in these schools.
- Determine how the performance of students in 2022 compared with that of 2023.
- Identify the views of all participants to provide qualitative insights and explanations for any observed changes and,
- Make recommendations based on evidence to inform policy and practice to bring improvements in secondary education institutions in the country.

1.2.4 Research Questions

- What was the performance of SETP schools in reading literacy, mathematic literacy, science literacy and 21st century skills?
- How does the performance of SETP schools in 2022 compare with 2023?
- How do the demographic characteristics of students and teachers explain the findings?
- What perceptions of the participants- student, teachers, board members, parents and opinion leaders explain observed changes.
- What recommendations based on evidence can inform practice and policy to bring improvement to secondary education.

2.0 SURVEY METHODOLOGY

2.1 Sampling design and process

2.1.1 Sampling of students

All second-year and third-year students in the 12 SETP schools were expected to take part in assessments of their proficiency in reading, mathematics, science, and 21st century skills toward the end of the 2022-2023 academic year. At the time of the assessments, however, only 57 percent of the second-year and 3 students were present in the schools[3]. In each school, all those student presents were selected and assessed. Each student completed one of the four assessment instruments.

2.1.2 Sampling of teachers using surveys

Stratified random sampling was used to identify and survey teachers in the SETP schools. Teachers in each sampled SETP school were first categorised by subject (core and elective courses), level of teaching (second-year and third-year), and then sex, after which they were randomly selected. This approach ensured that all teachers had an equal chance of being included in the study. The goal was to randomly sample 20 teachers in each SETP school. This process yielded a sample of 242 teachers.

2.1.3 Sampling of teachers using observations of their classroom lessons

One hundred and eighty teachers were randomly sampled from the 12 SETP schools. These teachers were observed in their classrooms[4]. The sampling ensured suitable representation of male and female teachers. In addition to having their lessons observed, the teachers were interviewed to provide insight and to triangulate the observed results. In addition, six students from the observed teachers' classes were randomly selected to participate in the student survey and key informant interviews. The students' questionnaires were self-administered.

2.1.4 Sampling process for heads of schools, board and senior management staff

In each of the SETP schools, the headteacher and one member of the senior management team were selected and interviewed to evaluate whether the schools' leaders understood their roles and responsibilities and could demonstrate with evidence the execution of these roles. In total, 24 stakeholders in this group were interviewed.

2.1.5 Summary of sample allocation for qualitative survey

[3] Attendance was a problem during the 2022 evaluation. School leaders and teachers revealed that some students did not come to school until as late as the fifth week of the academic year.

[4] Each lesson lasted about 45 minutes for single periods and 90 minutes for double periods. Care was taken to ensure that no one teacher was observed twice even if that teacher taught more than one subject. While the school was informed in advance that lessons of sample teachers would be observed, the selection of teachers was random. This prevented the teachers from preparing for the lesson observation and ensured that the observation captured a realistic situation in the schools

Table 2.1 Sample allocation for quantitative survey

Target stakeholder	Tool	Target	Actual	Response Rate
Head teacher and school management	Head teacher interview guide	24	24	100%
Teachers	Teacher lesson observations and interview guide on lesson	180	180	100%
	Teacher survey questionnaire	240	242	101%
Students	Student questionnaire	1,080	1,080	100%
	Student assessment		4,780	

2.1.6 Other qualitative survey (including parents, community members etc)

Qualitative data were collected via focus group discussions (FGD) and key informant interviews. These methods were used with the school boards, teachers, students, parents and opinion leaders. Table 2.2 presents the sample distribution for the qualitative survey.

Table 2.2 Summary of sample allocation for qualitative data collection

Target stakeholder	Tool	Target	Actual	Response Rate
Board members	Board members interview guide	24	24	100%
Teachers	Teacher interview guide	36	36	100%
Students	Student focus group discussion guide	24	24	100%
Parents	Parents' interview guide	36	36	100%
Opinion leaders	Opinion leaders' interview guide	36	36	100%
Documents	Document review guide	All SETP schools	All SETP schools	

2.2 Data management and analysis

The data collected were imported from the SurveyCTO platform and analysed using Stata version 16 software. A Do File was computed to store the syntax of the analysis, which will also be applied in follow-up surveys using the same computational procedures for purposes of uniformity. Data were analysed using descriptive statistics to establish disaggregated scores based on the relevant variables. The analysis was informed by the specific computational procedures provided in the approved data analysis plan. Beyond descriptive statistics, multivariate analysis using multiple linear regression models and exploratory factor analysis were used. T-tests and analysis of variance tests were conducted to test for significant differences in results where applicable. The multiple regression models helped measure the effect of demographic characteristics on key output and outcome indicators. Qualitative data analysis was conducted using thematic and content analysis to explain why desired changes had or had not occurred.

3.0 FINDINGS

3.1 Demographic profile of key respondents

3.1.1 Profile of students

The survey evaluated 4,780 students in the areas of reading, mathematics, science, and 21st century skills. About half the students assessed were female (51.8 percent), while males constituted 48.2 percent. To triangulate the results of the teacher lesson observation, 1,080 students completed a self-assessment questionnaire. Again, 51 percent of these students were female, and 49 percent were male.

3.1.2 Profile of teachers

A total of 180 teachers participated in the lesson observation sessions. Male teachers observed constituted 77 percent. A teacher survey was also completed by 242 teachers with male teachers comprising 70 percent. According to the data, 18 percent of teachers had taught for less than 5 years, 32 percent for 5 to 10 years, and 50 percent had taught for more than 10 years.

3.1.3 Profile of heads of school, boards and school management

The sex distribution of heads of schools and senior management staff interviewed is one sided. The data revealed that the majority of heads of schools are males (73 percent) compared with females (27 percent).

3.1.4 Profile of opinion leaders and Parents

Thirty-six opinion leaders and parents were sampled from the communities within which the SETP schools were sampled.

3.2 Student assessment results

3.2.1 What does the student assessment measure?

The National Council for Curriculum and Assessment (NaCCA) created a team of assessment experts in April 2022 to develop proficiency thresholds for the student assessments. The experts defined each of the assessment areas:

- Reading literacy: students' capacity to understand, use, evaluate, reflect on and engage with texts to achieve their goals, develop knowledge and potential, and participate in society.
- Mathematics literacy: students' capacity to formulate, employ and interpret mathematics in a variety of contexts. Such literacy includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena.
- Science literacy: students' ability to engage with science-related issues and with the ideas of science as reflective citizens. A scientifically literate person is willing to engage in reasoned discourse about science and technology. Doing so requires the competencies to explain phenomena scientifically, evaluate and design scientific enquiry, and interpret data and evidence scientifically.
- 21st century skills address foundational knowledge, competencies, and character qualities that are essential for success in today's world. These skills encompass critical thinking, problem-solving, creativity, effective communication, collaboration, digital literacy, and adaptability. Additionally, they include discipline and integrity, responsible citizenship, cultural identity, civic literacy, global citizenship, ICT and digital literacy, self-discipline, adaptability, and resourcefulness.

3.2.2 Test administration and monitoring

For 2022, the study assessed 3,572 year two and 1,238 year three students in the SETP schools. In 2023, 4,780 students were assessed. Table 3.1 disaggregates the data by schools.

Similar to the 2022 assessment, the 2023 assessments were paper-based and lasted an average of 90 minutes. The 2022 and 2023 test items (see annex 1) were identical and consisted of multiple-choice questions and questions requiring students to construct their own responses. Students also completed a short background questionnaire, which sought information about the students, their basic school education background, and their ages.

Table 3.1 Number of students assessed, by school, category, and year

Schools	Category[5]	Number of second-year students assessed		Number of third-year students assessed	
		2022	2023	2022	2023
Bolgatanga SHS	A	749	658	120	609
Benso SHTS	B	220	57	120	77
Bosome SHTS	B	453	163	120	339
Lambussie Community Day SHS	C	105	97	120	93
Nabango Community SHS	C	58	56	35	81
Gambaga Girls SHS	C	442	124	120	264
Walewale Vocational/Technical	C	326	89	120	257
Zabzugu SHS	C	455	242	120	462
Tatale E.P. Agricultural SHS	C	170	83	120	90
Ziavi Community SHTS	C	78	78	45	81
Ogyeedom Community SHTS	C	49	63	78	61
Mangoase SHS	C	467	304	120	352
Total		**3,572**	**2,014**	**1,238**	**2,766**

3.3 Results of the student assessment

3.3.1 How the results of the student assessments are reported

NaCCA developed five proficiency thresholds:

- Highly proficient – Students show a high level of proficiency in terms of knowledge, skills and values; can transfer them automatically and flexibly through performance tasks.
- Proficient – Students demonstrate a sufficient level of proficiency, fundamental knowledge, skills and core understanding; can transfer them independently through authentic performance tasks.
- Approaching proficiency – Students are approaching proficiency in terms of knowledge and skills and core understanding with little guidance; can transfer understanding through performance tasks.
- Developing – Students are developing proficiency in minimum knowledge and skills but need help throughout the performance of authentic tasks.
- Emerging – students are struggling with their understanding due to a lack of essential gaps in knowledge and skills.

Following the benchmarking of the student assessment instruments, NaCCA identified "Approaching proficiency" as the minimum level of proficiency that students should acquire by the end of their secondary education in reading, mathematics, and science literacy. That of the 21st century skills assessment was set at "Proficient" to align with the Organisation for Economic Co-operation and Development's Programme for International Student Assessment's assessment benchmark.

[5] GES classifies secondary schools into categories based on a pre-agreed definition by both Ministry of Education (MoE) and GES. Category 'A' schools are the best in the country, followed by the 'B', 'C' and 'D'. Categories are based on schools' academic performance and facilities. The list is updated every year. This report uses such classification to ensure proportional representation of each school category.

3.3.2 What students know and can do.

In Reading literacy

- Slightly less than 30 percent of students, on average, across the SETP schools were approaching proficiency or higher in reading literacy in 2023 (table 3.2). Approaching proficiency is the benchmark in reading literacy. At this level students can identify the main idea in text of moderate length. They can understand relationships or construe meaning within a limited part of the text when the information is not prominent by producing basic inferences, and/or when the text(s) include some distracting information.
- The proportion of students approaching proficiency or higher in reading literacy in 2023 is nearly 17 percent higher than in 2022. More students in Benso SHTS, Bosome SHS and Ogyeedom Community SHS were approaching proficiency or higher in reading literacy (table A2.1 in annex 2) in 2023 compared with other SETP schools. Slightly more male students were approaching proficiency or higher in reading literacy than females in 2023. While the variation between males and females in 2023 is slightly higher than in 2022, the difference is not significant[6].
-

In Mathematics literacy

- In mathematics literacy, there were marginal increases in the 2023 result compared with 2022. On average, about one-third of the SETP students were approaching proficiency or higher in mathematics literacy in 2023, up from about 30 percent in 2022 (table 3.2). At the minimum, these students can execute clearly described procedures, including those that require sequential decisions. Their interpretations are sufficiently sound to be a base for building a simple model or for selecting and applying simple problem-solving strategies.
- Second-year students outperformed third-year students in 2023. The mathematics teachers from SETP ascribed this issue to disciplinary problems, specifically the absenteeism of third-year students.
- Across the schools, Bolgatanga SHS had the highest proportion of students approaching proficiency or higher in mathematics literacy. Significantly more male than female students achieved this level of proficiency in 2023.

In Science literacy

- About 40 percent of the SETP students were approaching proficiency in science literacy in 2023 (table 3.2). The 2023 result is significantly higher than the 2022 result. At the minimum, students approaching proficiency can draw on moderately complex content knowledge to identify or construct explanations of familiar phenomena. In less familiar or more complex situations, these students can construct explanations with relevant cueing or support.
- There was a significant increase in the top performers (highly proficient and proficient only), from 5 percent in 2022 to 20 percent in 2023. As in the other areas, 'developing' and 'emerging' categories declined, suggesting positive progress as students moved to higher proficiency levels.

In 21st century skills

- The performance of students in 21st century skills changed significantly in 2023. Overall, 13.7 percent of students demonstrated proficiency or higher (the “minimum level of proficiency”) in 21st

[6] Differences are noted only when they are statistically significant at 0.05.

century skills in 2023 compared with 3.4 percent in 2022. At the minimum, these students can provide descriptions of situations that are less familiar or require deeper reasoning, such as ones that require causal reasoning.

Table 3.2 Students' proficiency levels in 2022 and 2023 (%)

	Reading literacy		Mathematics literacy		Science literacy		21st century skills	
	2022	2023	2022	2023	2022	2023	2022	2023
Highly Proficient (80-100%[7])	1.2	5.2*	2.3	3.1	0.8	8.1*	0.1	1.7
Proficient (68-79%)	2.7	9.5*	4.7	6.0	4.0	11.8*	3.3	12.0*
Approaching Proficiency (54 - 67%)	8.3	14.2*	22.9	23.2	11.5	20.9*	21.9	29.2*
Developing (40-53%)	19.4	19.9	41.4	45.2	31.6	24.0*	37.4	34.0
Emerging (0-39%)	68.5	51.2	28.7	22.5	52.2	35.2*	37.3	23.2*

*p≤0.05

[7] As defined by NaCCA based on the pretesting of the assessment tools, the percentages represent the proportion of items answered correctly by students in each assessment. For example, if student scored 80 percent, it means they answered 80 percent of the items correctly. Each item in the assessment is typically weighed equally when computing the percentage unless specified otherwise (please see the test items and framework in annex 1). The percentages are computed by dividing the number of correct answers by the total number of items in each assessment tool and multiplying this by 100.

3.4 Reading literacy

Reading achievement is essential for a wide variety of human activities – from following instructions, determining the who, what, when, where, and why of a situation, and the many ways of communicating with others for a specific purpose or transaction. Reading is also a component of many other domains of knowledge. Real-life problems require people to draw on their knowledge of mathematics and science. People must be able to read well to obtain the information they need. People also need to engage in the critical and analytical thinking inherent in reading as they make use of written information for their own purposes. No less important, literacy in reading is essential for a country's social, economic, and political development.

3.4.2 The framework for assessing reading literacy

The reading literacy framework conceptualizes reading literacy as an activity in which readers interact with the text they read and the tasks they want to accomplish during or after reading it. To be as complete as possible, the assessment covered three dimensions: texts (the range and format of the reading material), aspects (the type of reading task or reading processes involved), and situations (the range of contexts for which the text was constructed).

Text type

The reading literacy framework classified text type along six dimensions:

- Description (processes in a technical manual, catalogue, blog, diary)
- Narration (novel, comic strip, report in a newspaper)
- Exposition (essay, entry into encyclopaedia)
- Argumentation (letter to the editor, posts in an online forum)
- Instruction (recipe, instructions for operating software)
- Transaction (personal letter to share news, text messages to arrange a meeting

Aspects/cognitive processes

The assessment framework for reading literacy identified three aspects or cognitive processes:

- Access and retrieve within a text (navigating a text to locate and retrieve a particular piece of explicitly stated information). Search for and select relevant text.
- Integrate and interpret (processing what is read to make internal sense of a text). Represent literal information (comprehending the literal meaning of sentences and passages). Integrate and generate inferences (going beyond the literal meaning of information).
- Reflect and evaluate (drawing upon knowledge, ideas, or attitudes beyond the texts to relate the information provided in the texts to one's own conceptual and experiential frames of reference). Assess quality and credibility, reflect on content, and form and detect and handle conflict (determining whether multiple texts corroborate or contradict each other.

Situations

Situations refer to the contexts and purposes for which the text was constructed. Four situations are identified:

- Personal (letters, fiction, diary-style blogs)
- Public (public notices, news websites)
- Occupational (job advertisement in a newspaper or online)
- Educational (textbooks, interactive learning software)

Cognitive demand

- Low – Recall of a fact, term, principle, or concept or locate a single point of information.
- Medium – Use and apply conceptual knowledge to describe or explain phenomena.

- High – Analyse complex information, synthesize or evaluate evidence, justify reason given using several sources, develop a plan or sequence of steps to approach and resolve a problem.

The assessment of reading literacy included 40 items, of which 18 were multiple-choice and 22 were open-ended. Students were allowed 80 minutes to complete the assessment. The time allocated for all assessments was based on a psychometric analysis.

3.4.3 Proficiency levels for reading literacy

Student performance in reading literacy is reported as a score on a scale and also as mean scores. To help interpret what students' scores mean in substantive terms, the scale is divided into proficiency levels (based on work done by NaCCA) that indicate the kinds of tasks that students at those levels are capable of completing successfully. Table 3.3 illustrates the range of proficiency levels for reading literacy and describes the skills, knowledge, and understanding that are required at each level of the reading scale.

Table 3.3 Proficiency levels for reading literacy

Level of proficiency	Lower score limit	Characteristics of tasks
Highly proficient	80 - 100%	Highly proficient readers can comprehend lengthy and abstract texts in which the information of interest is deeply embedded and only indirectly related to the task. They can compare, contrast, and integrate information representing multiple and potentially conflicting perspectives, using multiple criteria, and generating inferences across distant pieces of information to determine how the information may be used. Highly proficient readers can reflect deeply on a text's source in relation to its content, using criteria external to the text. They can compare and contrast information across texts, identifying and resolving intertextual discrepancies and conflicts through inferences about the sources of information, their explicit or vested interests, and other cues as to the validity of the information. Tasks at this level typically require readers to create elaborate plans, combining multiple criteria and generating inferences to relate the task and the text(s). Materials at this level include one or several complex and abstract text(s), involving multiple and possibly discrepant perspectives.
Proficient	68 - 79%	Readers at this level can comprehend lengthy texts, inferring which information in the text is relevant. They can perform causal or other forms of reasoning based on a deep understanding of extended pieces of text. They can also answer indirect questions by inferring the relationship between the question and one or several pieces of information distributed within or across multiple texts and sources. Reflective tasks require the production or critical evaluation of hypotheses, drawing on specific information. Readers can establish distinctions between content and purpose, and between fact and opinion as applied to complex or abstract statements. They can assess neutrality and bias based on explicit or implicit cues pertaining to both the content and/or source of the information. They can also draw conclusions regarding the reliability of the claims or conclusions offered in a piece of text.

		For all aspects of reading, tasks at the proficient level typically involve dealing with concepts that are abstract or counterintuitive and require several steps until the goal is reached.
Approaching proficiency	54 - 67%	Readers at this level can identify the main idea in text of moderate length. They can understand relations or construe meaning within a limited part of the text when the information is not prominent by producing basic inferences, and/or when the text(s) include some distracting information. They can select and access a page in a set based on explicit though sometimes complex prompts and locate one or more pieces of information based on multiple, partly implicit criteria. Readers at this level can, when explicitly cued, reflect on the overall purpose, or on the purpose of specific details, in texts of moderate length. They can reflect on simple visual or typographical features. They can compare claims and evaluate the reasons supporting the claims based on short, explicit statements. Readers at this level may involve comparisons or contrasts based on a single feature in the text. Typical reflective tasks at this level require readers to make comparisons between the text and outside knowledge by drawing on personal experiences and attitudes.
Developing	40 - 53%	Developing readers can evaluate the literal meaning of simple sentences. They can also interpret the literal meaning of texts by making simple connections between adjacent pieces of information in the question and/or the text.
Emerging	39% and below	Readers at this level can scan for and locate a single piece of prominently placed, explicitly stated information in a single sentence, a short text, or a simple list. These readers can access a relevant page from a small set based on simple prompts when explicit cues are present.

3.4.4 How students performed in reading

The performance of SETP students in reading showed significant improvement in 2023 compared with the prior year. Across the SETP schools, 29 percent of the students were approaching proficiency or higher in 2023. This was about 12 percentage points higher that the nearly 17 percent achieved in 2022 (table 3.4). The improvement is statistically significant and indicates that these students can identify the main idea in a text of moderate length. They can understand relationships or construe meaning within a limited part of the text when the information is not prominent by producing basic inferences and/or when the text(s) include some distracting information.

Schools such as Bolgatanga SHS, Benso SHTS, and Ogyeedom Community SHS recorded the highest proportion of students approaching proficiency or higher in reading literacy in 2023. The difference between their 2022 and 2023 results is statistically significant, with Ogyeedom Community SHS showing the most substantial increase in the proportion of students approaching proficiency or higher (table 3.4).

Schools that previously had less than one in ten students approaching proficiency or higher in 2022, such as Zabzugu SHS, Ziavi Community SHTS and Nabango Community SHS showed improvement following the implementation of intensive English Language remedial lessons. The proportion of students now approaching proficiency and higher in reading literacy in these schools increased significantly (table 3.4).

Furthermore, the proportion of top-performing students in reading literacy (proficient and higher) increased from 4.8 percent in 2022 to 14.7 percent in 2023 (table 3.4). These top-performing students can comprehend lengthy texts, deal with concepts that are abstract or counterintuitive, and establish distinctions between facts and opinions based on implicit cues pertaining to the content or source of information.

While there has been a 17.3 percent reduction in the proportion of emerging SETP students in 2023 compared with 2022, this is not indicative of deteriorating performance. Instead, it is a positive sign that many students previously classified in these lower proficiency levels have moved up to higher proficiency levels. For instance, 80 percent of students in Nabango Community SHS and Gambaga Girls SHS were emerging in reading literacy in 2022, but this situation improved significantly in 2023 (table 3.4).

Table 3.4 Percentage of students at different levels of reading proficiency – by school

	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching Proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023
Benso SHTS	0.0	14.3*	4.9	11.4	12.2	25.7	31.7	25.7	51.2	22.9*
Bolgatanga SHS	5.3	8.4	15.0	10.6	16.7	21.5	29.1	18.6*	33.9	41.1
Bosome SHS	1.3	9.5*	2.6	7.9*	13.0	9.5	20.8	19.1	62.3	54.0
E.P. Agriculture SHS	0.0	0.0	0.0	2.3	2.7	9.3	11.0	14.0	86.3	74.4
Gambaga Girls SHS	0.0	0.0	0.0	5.1*	0.0	4.1*	7.9	24.5*	92.1	66.3*
Lambussie Community Day SHS	0.0	4.2	0.0	10.4*	5.8	12.5	21.2	25.0	73.1	47.9*
Mangoase SHS	0.5	3.6*	1.0	13.3*	5.5	15.2*	22.0	26.7	71.0	41.2*
Nabango Community SHS	0.0	2.9	0.0	14.7	0.0	8.8	0.0	20.6*	100.0	52.9*
Ogyeedom Community SHTS	0.0	9.4	0.0	12.5	3.9	25.0*	34.6	25.0	61.5	28.1*
Walewale Vocational Technical Institute	0.0	0.0	0.0	1.2	0.0	3.5*	3.5	8.2	96.5	87.1*
Zabzugu SHS	0.0	3.4*	0.7	12.2*	3.3	13.5*	15.6	18.9	80.5	52.0*
Ziavi Community SHTS	0.0	5.1	0.0	7.7	13.3	18.0	31.1	10.3*	55.6	59.0
Overall	1.2	5.2*	3.5	9.5*	7.5	14.2*	19.4	19.9	68.5	51.2*

**p≤0.05*

3.4.5 SETP students' attainment of the different proficiency levels in reading literacy

Table 3.5 shows the distribution of students across the five proficiency levels.

Table 3.5 Percentage of students at different levels of reading literacy

Assessments	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	Survey 2022	Survey 2023	Survey 2022	Survey 2023	Survey 2022	Survey 2023	Survey 2022	Survey 2023	Survey 2022	Survey 2023
Sex										
Male	1.0	6.4*	5.9	7.9	12.3	16.7	33.5	20.0	47.4	49.0
Female	0.7	4.3*	2.3	10.7*	10.8	12.2	30	19.7*	56.3	53.0
Level of student										
Form 2	1.6	2.6	2.9	7.7*	7.8	15.2*	17.4	21.4	70.3	53.1*
Form 3	0	7.0*	1.9	10.7*	9.7	13.5	24.6	18.8	63.8	50.0*
School category										
Category A	5.3	8.4*	15.0	10.6	16.7	21.5*	29.1	18.6*	33.9	41.1
Category B	0.9	10.6*	3.4	8.7	12.7	13.0	24.6	20.5	58.5	47.2*
Category C	0.1	2.8	0.4	9.3	3.4	11.6*	15.2	20.2	80.9	56.2*
Overall	1.2	5.2*	4.0	9.5*	11.5	14.2	19.4	19.9	68.5	51.2*

*p≤0.05

Highly proficient

Across the 12 SETP schools, 5.2 percent of students were highly proficient in 2023 compared with only 1.2 percent in 2022. This result suggests that the strategies implemented to enhance reading literacy among a proportion of students in the SETP schools have been effective, particularly in increasing the percentage of students who are highly proficient in reading literacy. These highly proficient students can comprehend lengthy and abstract texts in which the information of interest is deeply embedded and only indirectly related to the task. They can compare, contrast, and integrate information representing multiple and potentially conflicting perspectives, using multiple criteria, and generating inferences across distant pieces of information to determine how the information may be used.

The proportion of highly proficient students in reading literacy for 2023 was much higher than in 2022 in Benso SHS, Bosome SHS, Ogyeedom Community SHS and Bolgatanga SHS.

One of the most remarkable success stories comes from Ogyeedom Community SHS, which has undergone an impressive transformation in just one year. In 2022, not a single student at the school was highly proficient in reading. However, by 2023, the percentage of students achieving this level of proficiency surged to 9.4 percent.

Recognising the students' weaknesses in reading and writing, the management and teachers of Ogyeedom Community SHS just like other SETP schools took proactive measures. They began by assessing the students to identify their strengths and weaknesses and then grouped them based on their performance. This allowed for targeted remedial lessons in reading and writing, tailored to the specific needs of each group.

These remedial lessons covered topics such as phonics, reading comprehension, and fluency, while the writing classes focused on sentence construction, paragraphing, and writing conventions. The school continued to assess the students' progress and adjusted their groupings in the remedial classes based on

their performance.

This strategic and responsive intervention has led to a significant improvement in the students' reading literacy scores. The fact that 9.4 percent of students moved to the highly proficient level is a clear indication of the success of this approach. This success story from Ogyeedom Community SHS serves as an inspiring example of what can be achieved with targeted interventions and dedicated effort.

Proficient

In 2023, the percentage of SETP school students who were proficient in reading literacy rose to 9.5 percent, a significant increase from the 4.0 percent recorded in 2022. These students referred to as top performers in reading, can comprehend lengthy texts, inferring which information in the text is relevant. They can perform causal or other forms of reasoning based on a deep understanding of extended pieces of text. They can also answer indirect questions by inferring the relationship between the question and one or several pieces of information distributed within or across multiple texts and sources.

In Nabango Community SHS, Mangoase SHS, Ogyeedom Community SHS and Zabzugu SHS, there was a significant increase in the number of top performers in reading literacy in 2023 (table 3.4). Specifically, about 10 percent more students in these schools achieved proficiency in reading literacy compared with 2022.

The increase in the number of top performers in reading literacy is another positive indication of the progress made in improving reading literacy skills among many SETP school students. It underscores the potential of targeted interventions and dedicated efforts in enhancing students' reading literacy skills.

Approaching proficiency

There has been a marginal improvement in the proportion of SETP students who were approaching proficiency in reading literacy in 2023 compared with 2022. Approaching proficiency is the minimum proficiency level for secondary school students as defined by NaCCA. In 2022, 11.5 percent of the SETP students were approaching proficiency in reading literacy, this has increased to 14 percent in 2023. Approaching proficiency readers can identify the main idea in text of moderate length. They can understand relationships or construe meaning within a limited part of the text when the information is not prominent by producing basic inferences and/or when the text(s) include some distracting information. They can select and access a page in a set based on explicit though sometimes complex, prompts and locate one or more pieces of information based on multiple, partly implicit criteria.

The increase in the proportion of students who were approaching proficiency in reading literacy was even more pronounced at the school level in 2023 compared with 2022 (table 3.4). For instance, in 2022, none of the students at Nabango SHS and Walewale Vocational Technical Institute were approaching proficiency in reading literacy. However, the 2023 results show a shift, with 8.8 percent, and 3.5 percent of students from these schools, respectively, now reaching the approaching proficiency level in reading literacy. This is a testament to the remedial lessons that these schools organised and in which close to half of their students participated.

Developing

The proportion of developing SETP students in reading literacy has shown a slight increase from 19.4 percent in 2022 to 19.9 percent in 2023. Although the difference between the two years is not statistically significant, it is important to examine the school-level data to gain a deeper understanding of the trends.

Upon analysing the school-level data in table A2.1 in annex 2, it becomes evident that there have been significant decreases in the proportions of developing SETP students in reading literacy in certain schools. These schools had recorded a high number of developing students in 2022, but their figures decreased in 2023. For example, in Ogyeedom Community SHS, the proportion of developing students decreased from 52 percent in 2022 to 25 percent in 2023. Similarly, Lambussie Community Day SHS saw a decline from 43.1 percent to 25 percent, and Benso SHTS experienced a decrease from 39.4 percent to 25.7 percent

(table 3.4).

Insights from English teachers at these schools shed light on the efforts invested in supporting students' reading and comprehension abilities. The teachers expressed excitement over the transformation they witnessed, as some students who previously struggled to read and understand texts now demonstrated competence in these areas. The teachers emphasised the rigorous work conducted during the remedial lessons to improve students' reading, writing, and overall comprehension skills.

Furthermore, the English teachers reported that the impact of these initiatives extended to other subjects as well. Other subject teachers praised the English department for its efforts, noting improvements in students' understanding of lessons in science, social studies, and other elective courses that involve extensive reading and comprehension of texts.

The school-level data also revealed an increase in the percentage of developing students in Nabango Community SHS from 11.1 percent in 2022 to 20.6 percent in 2023. This can be attributed to a decrease in the proportion of students classified as emerging, which declined from 88.9 percent to 52.9 percent in 2023. It is likely that many students who were initially categorised as emerging have now progressed to the developing level in reading literacy. While this represents an improvement, it is important to note that developing proficiency is still in the lower proficiency levels.

Given that 2 of every 10 SETP school student is still developing in reading literacy, it is crucial that the SETP schools sustain the current interventions and build on this positive development by continuing to provide targeted support and interventions to students who are still in the developing category.

Emerging
Students in this category of proficiency can understand and affirm the meaning of short, syntactically simple sentences on a literal level and read for a clear and simple purpose within a limited amount of time.

The proportion of emerging students in reading literacy decreased significantly by 17 percent in 2023 among the SETP schools. This decrease is particularly notable in three of the SETP schools, including Gambaga Girls SHS, Mangoase SHS, and Nabango Community SHS, (table 3.4).

Of interest is Gambaga Girls SHS where 80 percent of the students were emerging in reading literacy in 2022. The 2023 result showed a decrease of 14.6 percentage points, this is significant across sex and level (table 3.5). According to the head of the English department at Gambaga Girls SHS, the implementation of remedial lessons has contributed to noticeable improvements in students' reading abilities. However, the head attributed the substantial decrease in the proportion of emerging students to the strategies outlined in the second PLC handbook titled " Literacy Across the Curriculum". The head of the department emphasised that this handbook, specifically designed for PLC sessions, arrived at an opportune time and addressed a major issue students encounter. The handbook provides teachers with effective strategies to integrate literacy into their lessons, ensuring that all teachers in the school actively teach students how to read. The head of the English department strongly believes that this concerted effort from all teachers played a significant role in shifting the students' scores. This feedback is echoed by other SETP schools as well.

Progress in SETP students' reading literacy: A comparison between intervention participants and baseline performances

There has been significant improvement in the performance of third-year students in reading literacy particularly when their baseline result (2022, i.e., when they were in second-year) is compared with their 2023 results. As seen in table 3.6, in 2022, only 2 percent of current third-year students were classified as highly proficient in reading literacy. This figure increased to 7 percent in 2023, representing a difference of

5.4 percentage points. Similarly, the proportion of third-year students classified as proficient in reading literacy has seen an improvement, rising from 4 percent in 2022 to 11 percent in 2023.

When considering the combined percentage of highly proficient and proficient students, the data reveal that 18 percent of current third-year students are now top performers in reading literacy, compared with only 5 percent in 2022 when they were in second-year. This indicates an increase of 12 percent within a little over one year.

Furthermore, if we include students who are approaching proficiency (the minimum level set by NaCCA), the improvement becomes even more significant. In 2023, 31.2 percent of current third-year students were approaching proficiency or above in reading literacy, compared with 12.4 percent when they were in second-year in 2022. This represents an improvement of 19 percentage points within a relatively short timeframe.

These improvements are particularly pronounced at the school level. Bolgatanga SHS, Benso SHTS, and Bosome SHS showed significant increases in the percentage of current third-year students approaching proficiency or above in reading literacy. For example, in Benso SHTS, the proportion of the current third-year students at or above approaching proficiency level increased from 24.1 percent in 2022 to 53.9 percent in 2023. Similar improvements were observed in Ogyeedom Community SHS and Bolgatanga SHS. These improvements were consistent across both male and female students in these schools.

Additionally, there was a 1.4 percent decrease in the proportion of current third-year students classified as developing in reading compared with the results of the second-year students in 2022. This suggests that more students have progressed to higher proficiency levels, indicating positive growth and improvement in their reading skills.

Furthermore, many third-year students have transitioned from the emerging category in reading literacy to higher proficiency levels. In Nabango Community SHS, where all the third-year students were classified as emerging in reading literacy when they were in second-year, there has been a decrease in the proportion of emerging students. In 2023, 47 percent of third-year students were classified as emerging, indicating a transition to higher proficiency levels.

Similarly, in Gambaga Girls SHS, 30 percent of third-year students made the transition from the emerging category to higher proficiency levels in reading literacy.

Table 3.6 Reading literacy: Third-year students in (2023) versus third-year students in 20222 - (percent) - (percent)

	Second-year students baseline result (2022)		Current third-year students' endline result (2023)	Difference
Highly proficient	1.6		7.0	5.4
Proficient	3.5		10.7	7.2
Approaching proficiency	7.3		13.5	6.2
Developing	17.4		18.8	-1.4
Emerging	70.3		50.0	-20.3
N =	922		674	

To further validate the improvement in the performance of the current third-year students, we compare their results in 2023 with those of third-year students who were assessed in 2022 as part of the 2022 survey. These third-year students were not exposed to the comprehensive interventions provided to the third-year students in the SETP schools. As can be seen in table 3.7, there are considerable differences in reading skills between the two groups of third-year students. On the one hand, higher percentages of the SETP students were in the two highest categories of reading proficiency. On the other hand, compared with the

non-SETP students a smaller percentage of the SETP students were in the two lowest categories of proficiency.

Table 3.7 Reading literacy performance comparison: Intervention participants in third-year (2023) vs. non-participant third-year students assessed in 2022 - (percent)

	Third-year SETP participants in 2023	Third-year non-SETP students in 2022	Difference
Highly Proficient	7.0	0.0	7.0
Proficient	10.7	3.6	7.1
Approaching Proficiency	13.5	8.0	5.5
Developing	18.8	24.6	-5.8
Emerging	50.0	63.8	-13.8
N	674	362	

Table 3.8 presents a comparison of the reading literacy performance between the current second-year students in SETP schools and the baseline results of second-year students in these same schools in 2022. The analysis reveals notable differences in the proficiency levels achieved. As can be seen in table 3.8, there are considerable differences in reading skills between the two groups. On the one hand, higher percentages of the current second-year students were in the two highest categories of reading proficiency. On the other hand, compared with the second-year students assessed at baseline in 2022, smaller percentage of the current second-year students were in the two lowest categories of proficiency.

Table 3.8 Reading literacy performance: Intervention participants now in second-year (first year at 2022 baseline) vs. 2022 baseline results of second-year students - (percent)

	Current second-year SETP students	Second-year SETP students in 2022	Difference
Highly Proficient	2.6	1.6	1.0
Proficient	7.7	3.5	4.2
Approaching Proficiency	15.2	7.3	7.9
Developing	21.4	17.4	4.0
Emerging	53.1	70.3	-17.2
N	454	922	

3.4.6 The impact of study duration on students' reading literacy performance

Table 3.9 presents an analysis of the impact of study duration on students' reading literacy. The table includes the average reading literacy scores and the percentage of students classified as top performers (proficient or higher) in reading literacy, based on the number of hours dedicated to studying reading during their personal study time. The number of hours spent studying is estimated and self-reported.

Table 3.9 Students' mean reading literacy by hours spent studying reading

Hours spent studying reading	Mean literacy score	% of students that are top performers (proficient or higher) in reading literacy	N
Less than 2 hours a week	35.6	15.1	218
2-4 hours a week	43.9	17.7	130
5-7 hours a week	39.0	15.2	244
8 or more hours a week	44.1	24.2	120

The findings from the analysis reveal intriguing insights about the relation between study duration and reading literacy performance. Students who allocated less than 2 hours per week to reading had an

average literacy score of 35.6. However, only 15.1 percent of these students achieved top performer status in reading literacy. This indicates that minimal study time may not be sufficient for students to attain high levels of reading literacy. In contrast, students who studied the most were among the most proficient readers.

School-specific results reveal a fascinating pattern. For instance, in Ogyeedom Community SHS, a plurality of students (37.9 percent) reported dedicating 8 or more hours a week to studying reading Language. This commitment was reflected in their mean score of 59 percent in reading literacy, considerably higher than the average, and 36.4 percent of these students were top performers, thus achieving proficient or higher in their reading literacy.

However, the correlation between study hours and performance is not a straightforward linear trend across all schools. In some schools, students dedicating a moderate amount of time, such as 2-4 hours weekly, displayed surprisingly high proficiency levels. For instance, in Benso SHTS, students studying reading for 2-4 hours a week achieved a mean score of 64.6 percent, with a significant 42.9 percent of these students in the proficient or higher levels.

Such observations highlight that while dedicated study hours can play a role in enhancing students' proficiency, other factors are also relevant. The quality of the study time, the effectiveness of the study methods, and the level of support students receive during their personal study time can be equally or even more significant.

The nuanced patterns observed in these data prompt further inquiry into how schools can effectively support their students in their personal study time.

3.4.7 Students' performance in the different aspects of reading literacy

Table 3.10 provides an analysis of SETP students' performance in different aspects of reading literacy. Comparing the mean percentages from 2022 to 2023 reveals insights into the progress made by students in each of these areas.

Table 3.10 Students' performance in different aspects of reading literacy (mean percent)

Domains	2022	2023
Text type		
Description	41.7	46.8
Narration	17.8	30.4*
Argumentative	17.2	25.7*
Instruction	20.3	24.6
Aspects/cognitive processes		
Access and retrieve	39.0	42.8
Integrate and interpret	27.0	37.5*
Reflect and evaluate	19.2	29.9*
Situations		
Personal	7.9	12.3
Public	35.0	39.7
Cognitive demand		
Low	38.1	42.6
Medium	22.5	35.2*
High	20.3	27.6*

*p≤0.05

In terms of the text type domain, there have been improvements in students' performance across all categories. The mean percentage for text description increased from 41.7 percent in 2022 to 46.8 percent in 2023. Similarly, there were notable improvements in narration, argumentative, and instruction texts, with increases in mean percentages for each category.

The analysis of cognitive processes reveals progress in students' abilities to access and retrieve information from texts. The mean percentage for this aspect increased from 39.0 percent in 2022 to 42.8 percent in 2023, indicating improved skills in locating and extracting relevant information. There were also substantial improvements in integrating and interpreting texts, as well as reflecting and evaluating the content, with notable increases in mean percentages for these cognitive processes.

When considering the situations in which reading literacy skills are applied, there were positive developments in both personal and public contexts. The mean percentage for personal situations increased from 2022 to 2023. In the public situation category, the mean percentage also increased, demonstrating enhanced skills in understanding texts with broader societal relevance.

The analysis at the school level further highlights the variation in performances. Benso SHTS and Ogyeedom Community SHS demonstrated notable performance across the different aspects of reading literacy.

Overall, the result of students' performance in different aspects of reading literacy emphasises several positive improvements across various domains. Nonetheless, there is a need to further strengthen students' abilities in specific areas, particularly in instruction and argumentative texts, and to nurture higher cognitive demand levels for deeper comprehension and critical thinking.

3.4.8 Modelling student performance in reading literacy

To understand the factors influencing students' performance in reading, a multiple regression analysis was conducted. The analysis considered several variables, including sex, age of the student, remedial class attendance, having a desk at home for studying, having a reading textbook at home for studying, number of hours studying in a week, and the presence of books in the household (see table 3.11).

Table 3.11 Output of multiple linear regression of reading literacy

Characteristics	Coefficient (Sig*)	95% confidence interval
Age of student	-0.022	-0.071, 0.026
Sex of student	1.036	-2.733, 4.805
Remedial class attendance	2.522*	-1.258, 6.302
Have a desk at home for studying	7.448*	3.594, 11.303
Have a reading textbook at home for studying	3.189	-0.666, 7.045
Number of hours studying in a week	0.297*	0.073, 0.52
Have books in the household	1.002	-0.392, 2.396

*p≤0.05

Students who attended remedial classes performed better in reading compared with those who did not. This highlights the effectiveness of targeted interventions and additional support in improving students' reading abilities. Similarly, the analysis revealed a positive association between having a study desk at home and reading proficiency. This finding suggests that a conducive learning environment can positively impact reading skills.

Finally, the analysis revealed a positive correlation between the amount of time students spent studying and their reading scores. Students who dedicated more hours to studying reading-related materials demonstrated higher levels of reading proficiency.

3.4.9 Qualitative findings on reading literacy

3.4.9.1 Factors contributing to improved proficiency in reading among SETP school students

Qualitative findings from interviews with English Language teachers, SETP students, and school heads shed light on the factors that contribute to the improved proficiency in reading among SETP school students. These factors provide valuable insights into the strategies and initiatives that have positively influenced students' reading abilities.

1. **Remedial lessons in reading and writing**

One key factor identified as contributing to improved proficiency among SETP students is the implementation of remedial lessons in reading and writing. English Language teachers recognise the importance of providing additional support to students who are struggling with reading. These remedial lessons have been designed to target specific areas of need, such as reading fluency, comprehension, and writing skills.

During the interviews with these teachers, they shared their experiences and strategies used in these remedial lessons. One teacher mentioned, *"We started with alphabets, we then had to move to formation of 2 letter words, 3 letter words and then simple sentence and all that and so on day 1 we started with the alphabets and it will be surprising to you that some cannot identify the alphabets, the upper case and the lower case so from there, when they were able to do that then we moved to 2 letter words, 3 letter words and all that".*

A teacher also noted the following: *"In our remedial sessions, we focus on developing students' reading fluency by incorporating activities that involve repeated reading, using phonics and sight word practice. We also work on their comprehension skills by teaching them strategies to identify main ideas, make inferences, and analyse the text".* Another teacher emphasised the importance of individualized support: *"We assess each student's reading level and tailor our instruction to meet their specific needs. We provide one-on-one support, use guided reading strategies, and offer targeted practice to help them improve their reading abilities".*

Below are additional quotes from teachers:

"You see that, before we started this program, the students were not really speaking English and the output of work was very appalling. Yes, I am saying they couldn't even comprehend anything and reading was very bad, and the speaking of English was also very bad. Because their background isn't that good, they are not having a formidable foundation in English that they can even express themselves. So, with the introduction of this program in our school, now, you see that there is improvement in their speaking and writing. "

"They can speak English…at first when you even call them, they would be running away from you because you will force them to speak English. But now, when they even meet you, they start speaking English. This program has also helped them with their writing. They have been writing for me to just be reading. "

These quotes from the teachers highlight the personalised approach taken in the remedial lessons. The teachers are aware of the diverse needs of their students and adapt their instruction accordingly.

In addition to the teachers' insights, the students shared their experiences during the interviews. They expressed gratitude for the remedial lessons, stating that they have helped them become more confident readers. As one student mentioned, *"Madam the remedial classes really helped some of us because at first some of us were not able to read and write, and before that anytime we are having the class when you go the teacher will start teaching you the alphabet and the sounds. "*

"The extra reading lessons have made a huge difference for me. I used to struggle with understanding the text, but now I feel more comfortable and can comprehend what I'm reading." Another student shared, *" It is helping small-small especially in the English language. At first we were not able to write letters, but we can now write them very well."*

The qualitative insights from the teachers and students emphasise the positive impact of the remedial lessons in reading and writing. The personalised instruction, targeted strategies, and individualised support provided in these sessions have contributed to improved reading fluency, comprehension, and writing skills among the students. The students' feedback further confirms the effectiveness of these lessons in building their confidence and improving their overall reading abilities.

2. Teachers' application of the PLC sessions on "Literacy Across the Curriculum" in class

The SETP English teachers also stated that the application of the PLC session handbook "Literacy Across the Curriculum" has proven to be a significant factor in improving students' proficiency in reading among SETP schools. According to the English Language teachers, their colleague teachers who teach other subjects have embraced this approach and actively integrated literacy skills into their subject-specific lessons. They have recognised the importance of promoting reading comprehension and critical analysis in all academic disciplines.

During the interviews with the English teachers, they shared their experiences and insights regarding the implementation of the PLC sessions. One teacher mentioned, *"Yeah, and our colleague teachers too were not encouraging them to speak English initially, it was left in the hands of the English department. But through this PLC handbook, they have realised that this is a holistic thing they should come on board. "*

The teachers explained that they had incorporated reading tasks, such as analysing scientific articles, interpreting social studies documents, and solving word problems, into their subject-specific lessons. They have also implemented collaborative activities that encourage students to discuss and analyse texts, promoting critical thinking and deeper understanding. A science teacher indicated: *" In our science class, I assign reading materials related to the topics we are studying. The students have to read and analyse scientific texts, and we engage in discussions to deepen their understanding. It helps them develop their scientific literacy and enhances their ability to comprehend complex scientific concepts"*

Insights from the students further support the effectiveness of the PLC sessions on "Literacy Across the Curriculum." They acknowledged that their understanding of subject-specific texts has improved as a result of the integration of literacy skills. One student shared, *"I used to struggle with my science textbook, you know the Aki Ola. I read it but it is difficult to even understand what I am reading. I used to try. Then our science teacher came to class and said he will be sharing the reading for us. You will read, another person will read, if you are finding it difficult, he will help you on how to pronounce the word. He was doing this all the time. Then he will explain the topic. "*

A student further stated, *" The science master, first at form one when we started, he used to teach. When he comes, he delivers, unless you have a problem before you go and consult him but now, he told us himself that he has tried to read our minds. At first, he didn't want to open up but now he has tried to read*

our mind to get the contents we understand and the content we don't understand. In class those who don't like talking at all he makes sure to get close to them to actually identify what is bothering them and why they are not contributing to class because most of them in class they are actually silent but when they move outside the class they talk. So, he tries to get what is bothering them and helps them in solving it. Even not only at the class level but he supports when you are in need."

These student insights highlight the positive impact of integrating literacy skills across the curriculum. Students have recognised the value of reading in their overall academic development and have witnessed improvements in their reading comprehension and analytical abilities. They appreciate the efforts of their teachers to incorporate reading strategies into subject-specific lessons, as it has enhanced their understanding and engagement with the texts.

3. Change in teachers approaching to teaching as result of PLC session

Insights from the English teachers in the SETP schools reveal that the PLC sessions have brought about changes in their approaches to teaching, resulting in improved student outcomes in reading literacy. The English teachers indicated that they have embraced innovative instructional practices that foster student engagement and learning.

One notable change is the incorporation of interactive and engaging activities in the classroom. The teachers stated that they have introduced group discussions, role-playing, and hands-on projects to make the learning process more dynamic and participatory. These activities encourage students to actively engage with texts, ask questions, and explore different perspectives. As a result, students become more motivated and invested in their learning, leading to enhanced reading comprehension and analysis.

Additionally, the English teachers stated that they have placed a greater emphasis on promoting discussions and debates among students. They facilitate meaningful conversations that encourage students to express their thoughts, analyse diverse viewpoints, and support their arguments with evidence from the texts. These discussions not only deepen students' understanding of the texts but also foster their communication skills. English teachers have observed that students' active participation in class discussions has significantly improved their ability to comprehend and interpret complex texts.

Furthermore, the English teachers indicated that they have recognised the importance of independent reading and reflection. They provide dedicated time for students to read independently and reflect on the texts they encounter. This practice promotes self-directed learning and allows students to develop a personal connection with reading. English teachers have noted that students' engagement in independent reading has led to an expanded range of reading interests and an increased love for reading.

Insights from English teachers highlight the positive impact of these changes in teaching approaches on student performance in reading literacy. Below are quotes from the English teachers:

" The PLC and SETP have impacted my lesson delivery positively. Because through the programs that SETP organized for us, on a regular basis, including the PLC that we have in the school, we have learnt a lot of techniques, methods and strategies of teaching. The common ones include putting students in groups in the course of lesson delivery. I think that one, everybody does it in the school."

" In terms of students' motivation, we have learnt a lot. Sometimes, in the course of lesson delivery, if students find it difficult to understand your lesson, it could be that they have hidden problems. So, through the program we have been attending, we have got to know that we students with different attention focus. And so, we learn techniques and strategies, different types to be able to handle those students. Now, I can assure you that we are good at using those methods and strategies."

" Maybe following up after a lesson or in the course of a lesson, you find out that the students don't pay attention, you can see the student privately and even follow up, I have been following up with students to find out why they don't come to school regularly or maybe they don't pay particular attention in class. So, it is all because of the T-TEL activities that are going on in our school here."

Insight from the students supports the positive impact of these changes in teaching approaches. Students have shared that the interactive activities, discussions, and independent reading opportunities have made their learning experiences more enjoyable and meaningful. They feel more empowered to take ownership of their learning and actively participate in class.

Overall, the changes in teachers' approaches to teaching as a result of the PLC sessions have created a more dynamic and student-centred learning environment. The integration of interactive activities, discussions, and independent reading has fostered students' love for reading, leading to an improvement in their proficiency in reading literacy.

4. SETP schools' motivation of best performing English Language students

The motivation and recognition of high performing students within the SETP schools have had a significant impact on improving reading proficiency. According to the headteachers of the SETP schools, they have implemented various strategies to celebrate and acknowledge the achievements of students who have demonstrated exceptional reading abilities.

One key approach has been the implementation of incentives and rewards to recognise the progress and hard work of these students. The headteachers stated that they organised award ceremonies, where students are publicly acknowledged for their achievements in reading literacy. Prizes were given to these high-performing students as a way to appreciate their efforts and dedication. This recognition serves as a powerful motivator, inspiring these students to continue excelling in their reading skills. One headteacher noted:

"When my students completed the remedial class, we decided that we needed to do something to appreciate the progress they made. So, we awarded a lot of them. We said kind words to them, we provided them with story books, nicely packaged as a token to show that we are with them, and we see the development."

The feedback from the students indicates that the recognition and rewards have a profound impact on their motivation and self-esteem. The students noted that through the celebration of their achievements and providing them with tangible tokens of appreciation, they feel valued, supported, and encouraged to continue their reading journey. Below are some quotes from the students:

" It was organized here, and we were supposed to read for our colleagues and the teachers here, I was scared. So, when I came here, I was panicking, I was like I can't read and my colleagues were like you can read. After the reading I cried because I was making errors and all that, so when I got to the dormitory for one whole week I didn't eat and surprisingly the following week it was an award ceremony. Surprisingly I was called here for an award."

" And they will, like our class, our subject master is always making a promise that try and learn and if you pass, I will give you this, I will reward you and he always tries hard to fulfill and after a semester they used to award the best student in the subject so if I did not get an award this semester, I always try harder to get some."

" At the end of every semester they will just take a particular day, call us and award the best performing students. So, you see your colleagues taking the award, you too will try to improve more so that next time you will be the one to take it. It is also good ."

"We will be sweeping more awards and that we have been sparked by the awards to strive for excellence."

This positive reinforcement helps to create a nurturing and inspiring learning environment where students are motivated to excel in reading literacy.

3.4.7.2 Strategies being adopted by SETP school English teachers to improve reading literacy among lower proficiency students

Despite the overall improvement in reading literacy among the SETP school students, about 5 of every 10 SETP student is still 'emerging' in reading literacy. The English Language teachers of the SETP schools have provided valuable insights into the strategies they will employ to improve reading literacy among students with lower proficiencies. These strategies aim to address various challenges and ensure that every student receives the necessary support and guidance to enhance their reading skills. Here are the plans they have put forward:

1. **Conscientisation of students about the importance of learning English**

The SETP English teachers plan to continue conscientising their students about the importance of English Language as a subject. The teachers further indicated that they have observed a significant change in students' attitudes towards learning English after they were conscientised about its relevance. One teacher mentioned, *"There was a time that I heard the students saying that 'English, we don't learn it'. But later, I had to speak to them about the need to learn English, that is why we are learning it in school. And they are reading. And sometimes, they even read ahead."*

To continue conscientising their students, the English teachers plan to implement various strategies. They will focus on showcasing the practical applications of English in everyday life, emphasising its importance for effective communication, accessing information, and pursuing career opportunities.

Additionally, the teachers indicated that they would incorporate authentic materials and real-life examples into their lessons. They further stated that they will use English language books, articles, videos, and other resources that reflect students' interests and experiences that can create meaningful connections and foster a genuine appreciation for the language. The teachers also plan to encourage students to explore English outside of the classroom, such as by engaging with English-language media and participating in extracurricular activities that promote language acquisition and cultural exchange.

Furthermore, the teachers will continue to create a supportive and inclusive classroom environment. They will foster open discussions, collaboration, and peer learning opportunities, allowing students to express themselves in English without fear of judgment.

Through these conscientisation efforts, the SETP English teachers are determined to instil a sense of purpose and motivation in their students regarding the importance of reading. They believe that by helping students recognise the practical and personal benefits of English proficiency, they can inspire a lifelong love for the language and empower students to reach their full potential.

2. Peer learning

The English teachers further highlighted the effectiveness of peer learning in supporting students with low proficiencies in reading literacy. They expressed their intention to continue employing peer learning strategies to enhance students' reading skills. According to the SETP teachers, peer reading has proven to be an effective approach where they assign specific reading tasks to individual students and encourage them to explain and discuss the concepts with their peers.

One English Language teacher shared her experience, stating,*"I have started with the peer teaching. I will tell them the area we are going to have in the following session. So, I tell you, you read this and the others too, read this. I can point, it can even be that one person can be called to come and explain it."*

The English teachers emphasised the benefits of peer learning in fostering a collaborative and supportive classroom environment. Through peer discussions and interactions, students develop communication skills, learn to articulate their thoughts, and actively listen to their peers. They also learn from their peers' explanations, gaining alternative insights and approaches to understanding the material. Peer learning promotes a sense of shared responsibility for learning, as students feel supported and empowered to contribute to their classmates' learning experiences.

To continue employing peer learning strategies, the English teachers plan to assign reading tasks that require students to explain and discuss the concepts with their peers. They will provide guidance and facilitate the peer learning process, ensuring that all students have opportunities to both learn from their peers and contribute their own understanding.

3. Guidance and counselling

Some English teachers within the SETP schools have recognised the importance of providing guidance and counselling to students who may be facing difficulties in their reading literacy development. They acknowledge that some students may have hidden problems or personal challenges that impact their learning and overall academic performance. As a result, the teachers plan to implement strategies to ensure that these students receive the necessary support and assistance.

One teacher shared their insight, stating, *"In fact, I learned a lot because I realized that there are people that are needed to... In fact, sometimes we think that a dubious student should be sacked, but I realized that those students need to be counseled, followed up, sit with them, and they will improve, and it helps a lot."* Another teacher mentioned, *"Right now, I use a counseling session as I said earlier on, and again I have been having extra meetings with such students."*

The SETP English teachers also indicated that they would employ one-on-one sessions, extra meetings, and follow-ups. According to the teachers, this allows them to connect with the students, understand their individual challenges, and provide the necessary guidance and support tailored to their specific needs.

Moreover, the teachers recognise that counseling is not limited to academic matters but extends to broader aspects of students' lives. The teachers believe that by establishing trust and open communication, they can create a supportive relationship that goes beyond the classroom.

In order to implement effective guidance and counseling strategies, the English teachers plan to schedule counseling sessions, conduct extra meetings, and engage in ongoing follow-ups with the students. These proactive measures will allow the teachers to identify and address any concerns promptly, provide guidance and support, and ensure that students have the resources they need to succeed in their reading literacy journey.

4. Differentiated instructional approaches

In order to accommodate students with specific needs, The SETP English teachers indicated that they would implement differentiated instructional approaches. According to the teachers, they will continue to identify students with visual impairments and adjust their seating arrangements to provide better support. Additionally, for students who struggle with grasping certain concepts, the teachers indicated that they would repeat the topics or delegate other students to provide additional explanation and assistance. Below are some quotes from the teachers:

" Sometimes, I invite colleagues to handle some topics. If I find out that ooh, there is a problem with this topic, I invite somebody to help…the students find it difficult to understand this topic, we do as if there is a plaything, by the time that the visitor leaves, they would have understood what concept I want to carry across."

" In terms of students' motivation, we have learnt a lot. Sometimes, in the course of lesson delivery, if students find it difficult to understand your lesson, it could be that they have hidden problems. So, through the program we have been attending, we have got to know that there are students with different attention focus. And so, we learn techniques and strategies, different types to be able to handle those students. Now, I can assure you that we are good at using those methods and strategies."

"Mostly, if you identify those students with difficulties, especially, last batch, those who left, there was one student who always sit in front so I didn't understand why. But I finally found out that he is suffering from eye problem. So, you know, you have to do what is called sitting arrangements so that at least, you will be able to cater for such people. If there is difficulties too, sometimes you can just delegate other students to teach her."

" Remediation? Sometimes, I have to repeat the whole topic when I feel they had not really grasped the concept. So, I think that is a form of re…the question?"

" First, I will find out from the student, what the problem is. Before I can…maybe it's because of the language that the person doesn't understand it. So, it's either I use the local language to explain to him or her."

3.5 Evaluation of science literacy assessment

3.5.1 Science literacy assessment

The assessment of science literacy measured students' ability to engage with science-related issues and with the ideas of science as reflective citizens (please see item framework for science literacy attached as annex 1). Engaging in reasoned discourse about science and science-based technology requires a sound knowledge of facts and theories to explain phenomena scientifically. Such discourse also requires knowledge of the standard methodological procedures used in science and knowledge of the reasons and ideas used by scientists to justify their claims, to evaluate (or design) scientific enquiry, and to interpret evidence scientifically.

3.5.2 The framework for assessing science literacy.

Scientific literacy is defined as the knowledge and understanding of the content of science, the procedures, or methods of designing and evaluating a scientific enquiry, and the rationale behind the usual practices and fundamental terms in scientific enquiry.

Three scientific competencies underpin scientific literacy: (a) the ability to explain phenomena scientifically; (b) the ability to design and evaluate scientific enquiry; and (c) the ability to interpret data and evidence scientifically within a range of personal, local, national, and global contexts. The assessment framework for science includes three subdomains:

- The contexts in which tasks are embedded.
- The competencies that students need to apply.
- The knowledge domains involved.

Contexts

- Personal (self, family, and peer groups)
- Local
- National
- Global (life across the world) in health, natural resources, the environment, hazards and the frontiers of science and technology

Competencies

- Identify scientifically oriented issues.
- Explain phenomena scientifically.
- Use scientific evidence.

Knowledge domain

- Knowledge of content of science (physical systems, living systems, technology systems and earth and space science),
- Knowledge about science: scientific Inquiry and scientific explanations

Cognitive demand

- Low - Recall a fact, term, principle, or concept or locate a single point of information from a graph or table. Merely requires the recollection of one piece of information and requires low cognitive demands, even if the knowledge itself might be complex.
- Medium - Use and apply conceptual knowledge to describe or explain phenomena, select

appropriate procedures involving two or more steps, organize and display data, and interpret or use simple data sets or graphs. Requires the recollection of more than one piece of information and requires a comparison.

- High - Analyse complex information or data, synthesize or evaluate evidence, justify reasons based on various sources, and develop a plan or sequence of steps to approach a problem.

The science literacy assessment contains 40 questions items developed by NaCCA. Thirty-four of the items were multiple choice, and six were open-ended. Students were allowed 60 minutes to complete the assessment.

3.5.3 Proficiency levels for science literacy

Student performance in science literacy is reported as a score on a scale and also as mean scores. To help interpret what students' scores mean in substantive terms, the scale is divided into proficiency levels (based on work done by NaCCA, see annex 1) that indicate the kinds of tasks that students at those levels are capable of completing successfully. Table 3.12 illustrates the range of proficiency levels for science literacy and describes the skills, knowledge, and understanding that are required at each level of the science scale.

Table 3.12 Proficiency levels for science literacy

Level of proficiency	Lower score limit	Characteristics of tasks
Highly proficient	80 - 100%	Highly proficient students can draw on a range of interrelated scientific ideas and concepts from the physical, life, and earth and space sciences and use content, procedural and epistemic knowledge to offer explanatory hypotheses of novel scientific phenomena, events, and processes or to make predictions. In interpreting data and evidence, these students are able to discriminate between relevant and irrelevant information and can draw on knowledge external to the normal school curriculum. They can distinguish between arguments that are based on scientific evidence and theory and those based on other considerations.
Proficient	68 - 79%	At this level, students can use abstract scientific ideas or concepts to explain unfamiliar and more complex phenomena, events and processes involving multiple causal links. These students are able to apply sophisticated epistemic knowledge to evaluate alternative experimental designs and justify their choices and use theoretical knowledge to interpret information or make predictions. Proficient-level students can evaluate ways of exploring a given question scientifically and identify limitations of data sets, including sources and the effects of uncertainty in scientific data.
Approaching proficiency	54 - 67%	At the approaching proficiency level students can draw on moderately complex content knowledge to identify or construct explanations of familiar phenomena. In less familiar or more complex situations, students can construct explanations with relevant cueing or support. They can draw on elements of procedural or epistemic knowledge to conduct a simple experiment in a constrained context.

Developing	40 - 53%	Developing students are able to draw on everyday content knowledge and basic procedural knowledge to identify an appropriate scientific explanation, interpret data and identify the question being addressed in a simple experimental design. They can use basic or everyday scientific knowledge to identify a valid conclusion from a simple data set. Developing students demonstrate basic epistemic knowledge by being able to identify questions that can be investigated scientifically.
Emerging	39% and below	Students are unlikely to use basic or everyday scientific knowledge to recognise aspects of familiar or simple phenomena. They might not be able to identify simple patterns scientific terms and follow explicit instructions to conduct a scientific procedure.

3.5.4 How students performed in science literacy.

For science literacy, 40.8 percent of the SETP students were approaching proficiency or higher in 2023 compared with 16.3 percent in 2022 (table 3.13). At the minimum, these students can draw upon moderately complex content knowledge to identify or construct explanations of familiar phenomena. In less familiar or more complex situations, these students can construct explanations with relevant cueing or support.

Nearly 70 percent of students in Bolgatanga SHS and 50 percent of students at Bosome SHS were approaching proficiency and above in science literacy in 2023 compared with 28.4 percent and 35.3 percent, respectively, in 2022 (table 3.13). The difference is statistically significant.

A statistically significant 20 percent of the SETP students were either proficient or highly proficient in science literacy in 2023 compared with only 5 percent in 2022. These top performing science students, at the minimum, can use abstract scientific ideas or concepts to explain unfamiliar and more complex phenomena, events, and processes involving multiple causal links.

The majority of the top performing students are from Bolgatanga SHS (43.6 percent). The remaining top performing students are from Bosome SHS (27.1 percent), Lambussie Community Day school (16.7 percent) and Ziavi Community SHTS (16.7 percent).

The 'developing' and 'emerging' categories experienced a noticeable decline of 7.6 and 17 percentage points respectively. This is not a sign of deteriorating performance, but rather a positive indication that many students previously classified in these lower proficiency levels moved to higher proficiency levels. In particular, in 2022, the majority of the students in Nabango Community SHS (89 percent) and E.P. Agriculture, Tatale (78 percent) were emerging students in science literacy. These percentage declined to 40.6 and 47.7 percent in 2023 respectively. The differences are statistically significant (table 3.13).

Again, in Ogyeedom Community SHS, the majority of the students (52 percent) were developing in science literacy in 2022 respectively. This has declined significantly to 29 percent in 2023. The difference is statistically significant (table 3.13).

Overall, there has been a significant decline in the percentage of students in category C schools who are developing and emerging in science literacy by 25.9 and 48.8 percentage points respectively. The majority of these students (17.4 percent) are now approaching proficiency students. They are. moving up to higher proficiency levels (table 3.13).

Table 3.13 Percentage of students at different levels of science proficiency – by school

	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching Proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023
Benso SHTS	0.0	6.1*	8.5	3.0*	28.2	39.4*	39.4	30.3*	23.9	21.2*
Bolgatanga SHS	1.1	22.1*	10.8	21.5*	16.5	25.4*	37.5	18.9*	34.1	12.1*
Bosome SHS	4.6	9.8*	9.2	17.2*	21.5	23.8*	34.6	25.4*	30	23.8*
E.P. Agriculture SHS	0.0	0.0	0.0	4.6*	1.5	25.0*	20.3	22.7*	78.3	47.7*
Gambaga Girls SHS	0.7	2.1*	0.0	4.1*	1.4	12.4*	17.0	26.8*	80.9	54.6*
Lambussie Community Day SHS	0.0	2.1*	2.0	14.6*	15.7	25.0*	43.1	37.5*	39.2	20.8*
Mangoase SHS	0.0	1.9*	2.5	9.4*	13.1	20.6*	36.4	25.6*	48	42.5*
Nabango Community SHS	0.0	0.0	0.0	6.3*	0.0	15.6*	11.1	37.5*	88.9	40.6*
Ogyeedom Community SHTS	0.0	0.0	0.0	12.9*	16.0	29.0*	52.0	29.0*	32.0	29.0*
Walewale Vocational Technical Institute	0.0	0.0	0.9	3.5*	0.0	13.8*	17.4	19.5*	81.7	63.2*
Zabzugu SHS	0.0	1.1*	0.9	3.3*	7.3	12.0*	33.9	23.0	57.8	60.7*
Ziavi Community SHTS	0.0	2.8*	0.0	13.9*	11.9	25.0*	42.9	30.6*	45.2	27.8*
Overall	0.8	8.1	4.0	11.8*	11.5	20.9*	31.6	24.0*	52.1	35.2*

*p≤0.05

3.5.5 SETP students' attainment of the different proficiency levels in science literacy

Table 3.14 shows the distribution of students across the five proficiency levels.

Table 3.14 Percentage of students at different levels of science literacy

Assessments	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching Proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	Survey 2022	Survey 2023	Survey 2022	Survey 2023	Survey 2022	Survey 2023	Survey 2022	Survey 2023	Survey 2022	Survey 2023
Sex										
Male	1.0	12.1*	5.9	14.2*	12.3	22.7*	33.5	21.6*	47.4	29.4*
Female	0.7	4.7*	2.3	9.7*	10.8	19.3*	30.0	26.0*	56.3	40.2*
Level of student										
Form 2	0.8	6.4*	3.8	10.9*	11.2	25.6*	30.5	23.3*	53.7	33.8*
Form 3	0.9	9.4*	4.3	12.5*	12.2	17.2*	34.0	24.6*	48.7	36.3*
School category										
Category A	1.1	22.1*	10.8	21.5*	16.5	25.4*	37.5	18.9*	34.1	12.1*
Category B	3.0	9.0*	9.0	14.2	23.9	27.1	36.3	26.5	27.9	23.2
Category C	0.1	1.3	1.1	6.7	7.1	17.4*	29.0	25.9	62.7	48.8*
Overall	0.8	8.1*	4.0	11.8*	11.5	20.9*	31.6	24.0*	52.1	35.2*

*p≤0.05

Highly proficient

Across the 12 SETP schools, 8.1 percent of the students were highly proficient in 2023 compared with less than 1 percent in 2022. These highly proficient students can draw on a range of interrelated scientific ideas and concepts from the physical, life, and earth and space sciences and use content, procedural and epistemic knowledge to offer explanatory hypotheses of novel scientific phenomena, events, and processes or to make predictions.

Among the SETP schools, Bolgatanga SHS demonstrated exceptional progress. The proportion of highly proficient students increased to 22 percent in 2023 from 1 percent in 2022 (table 3.13). The substantial rise is also a result of an increased emphasis on science literacy (please see discussion under the qualitative section).

Arguably the most notable success stories are that of Benso SHTS school, which has undergone an extraordinary transformation. In 2022, not a single student performed at this level in science literacy. Fast forward a year, and the percentage of students achieving this level of proficiency surged to 6.1 percent. This positive turnaround is a testament to the effectiveness of the SETP interventions carried out at the school. The school administration identified that a foundational barrier to the students' science proficiency was their struggle with reading comprehension. The school then organised remedial lessons for the students, strategically designing and executing the remedial lessons to cater to the needs of students, focusing on the reading of scientific texts (further details can be found in section 3.5.9)

Proficient

Twelve percent of the SETP school students are proficient in science literacy in 2023 compared with 4 percent in 2022. The difference is statistically significant. Proficient students can use abstract scientific ideas or concepts to explain unfamiliar and more complex phenomena, events, and processes involving multiple causal links. These students can apply sophisticated epistemic knowledge to evaluate alternative experimental designs and justify their choices and use theoretical knowledge to interpret information or make predictions.

Bolgatanga has the highest share of proficient students (21.5 percent in 2023 compared with 10.8 percent in 2022). This is followed by Bosome SHS (17.2 percent) and Lambussie Community Day SHS (14.6 percent) (table 3.13). The difference between the performance of these schools in 2022 and 2023 is statistically significant. This is true across sex and class (table 3.14).

Interestingly, 3.5 percent of students in Walewale Vocational Technical Institute were top performers in science literacy in 2023 compared with 0.9 percent in 2022 (table 3.13). The students revealed that the exceptional progress they made is a direct result of their teachers' novel and effective teaching strategies, which were notably absent in previous years. One of the standout aspects of these strategies included the science teachers converting their classrooms into impromptu laboratories. Despite the lack of a large, dedicated science laboratory, the teachers brought science equipment into their classrooms, facilitating hands-on practical sessions. This creative setup was not only effective but also inviting, encouraging students to engage in learning activities more actively.

The success of these methods in Walewale Vocational Technical Institute is further amplified by the teachers' individualised approach toward student learning. Recognising that not all learners progress at the same pace, the science teachers dedicated time to address the needs of slower learners. According to the students, their science teachers encouraged a culture of questioning, promoting curiosity, and sparking a deeper understanding of the subject They also used group work, where students could learn from each other, developing not just scientific knowledge but also their collaborative skills and critical thinking. This effort increased students' confidence and space to grasp the scientific concepts at their own pace, thus promoting an inclusive learning environment.

Approaching proficiency

Twenty-one percent of the SETP students are approaching proficiency in science literacy in 2023 compared with 12 percent in 2022 (table 3.13). There are statistically significant improvements across sex, level of students, and school category (table 3.14). For instance, significantly more category C SETP students (17.4 percent) were approaching proficiency in 2023 than in 2022 (7.1 percent). This is particularly true for Benso SHTS (39.4 percent in 2023 compared with 28.2 percent in 2022), Bolgatanga SHS (25.4 percent in 2023, compared with 16.5 percent in 2022) and Lambussie Community Day SHS (25 percent in 2023 compared with 15.7 percent in 2022), (table 3.13). These approaching proficiency students in science literacy can draw on moderately complex content knowledge to identify or construct explanations of familiar phenomena. They can draw on elements of procedural or epistemic knowledge to conduct a simple experiment in a constrained context.

Again, as seen in table 3.13 more second-year students are approaching proficiency in 2023 (25.6 percent) than in 2022 (11.2 percent). In E.P. Agriculture SHS, the performance of second-year students more than doubled in 2023 compared with 2022 (table 3.14). After reviewing the results from the baseline survey, the school's management and teachers met to discuss their students' poor performance. They agreed that one of the key factors contributing to the poor performance of students in science literacy is their lack of proficiency in English. This finding is crucial, as it illuminated a fundamental barrier to effective learning.

Subsequently, just like other SETP schools, the school organised remedial lessons for students. This targeted intervention is designed to strengthen student's proficiency in English, thereby enabling them to better understand science literacy.

The results of this initiative have been profound and far-reaching. The students who participated in the remedial English sessions demonstrated significant improvements in their ability to read, understand, and engage with their science textbooks (see section 3.5.9). The teachers noted that the students developed a stronger grasp of the English language, both in general and scientific vocabulary. As a result, complex scientific concepts and terminologies became less intimidating and more comprehensible. The teachers further indicated that as a result of the remedial lessons, their students are now able to follow along during science lessons, fostering better classroom participation (please see section 3.5.9 for details and quotes).

Developing

The proportion of developing students in the 12 SETP schools was 31.6 percent in 2022. This has however decreased to 24 percent in 2023, signifying a noteworthy reduction of almost 8 percentage points. These significant differences were further noted for the sex and level of the students (table 3.14).

The reduction in the proportion of "developing" students implies that more students have moved into higher proficiency levels, perhaps approaching proficiency or even becoming top performers.

Ogyeedom Community SHS recorded the highest proportion (52 percent) of developing science students in 2022. This percentage decreased to 29 percent in 2023 (table 3.13). An insightful interview with the head of the school's science department sheds light on the factors driving this improvement. According to this person, the science teachers in the school predominantly relied on traditional, teacher-centred methodologies that did not utilise ICT or learner-centred approaches. After engaging in PLC sessions, where the significance of these methods was emphasised, a paradigm shift occurred. The science teachers started integrating ICT into the majority of their lessons, thereby creating an engaging and effective learning environment.

This revelation was corroborated during a FGD with students from the school. The students affirmed that their classrooms had indeed become more dynamic. They reported that their science teachers now regularly utilise technology such as projectors, laptops, and even mobile devices during lessons. The students indicated that their teachers display educational videos, use relevant visuals to illustrate lessons, and foster interactive learning experiences.

Both the head of the science department and students from the school expressed a shared belief that this transformative shift towards ICT-enabled, learner-centred teaching has played a key role in enhancing students' understanding of science. This positive change is not just confined to Ogyeedom Community SHS but is reflective of a broader pattern across all SETP schools, where the adoption of technology and innovative teaching strategies is fostering an environment conducive to improved learning outcomes (details on this can be found in section 3.5.9).

Emerging

There has been a significant decline in the proportion of students categorised as "emerging" in science literacy in the SETP schools (table 3.13). In 2022, 52.2 percent of the students fell into this category, a figure which dropped to 35.2 percent in 2023. This represents a decline of 17 percentage points, a significant progression in a little over one year (table 3.13).

Progress in SETP students' science literacy: A comparison between intervention participants and baseline performances

The improvement in science literacy among SETP students becomes apparent when comparing the 2023 results for third-year students with the results for second-year students in 2022 (table 3.15). In 2022, the students, were assessed to establish a benchmark for comparison before SETP's interventions. Subsequently, the interventions started in all 12 schools. These students, in their third-year in 2023, were re-assessed to evaluate SETP's impact.

Table 3.15 Science literacy: Third-year students in (2023) versus third-year students in 20222 - (percent)

	Second-year students baseline result (2022)	Current third-year students' endline result (2023)	Difference
Highly proficient	0.8	9.4	+8.6
Proficient	3.8	12.5	+8.7
Approaching proficiency	11.2	17.2	+6
Developing	30.5	24.6	-5.9
Emerging	53.7	36.3	-17.4
N	786	680	

The proportion of highly proficient students rose from 0.8 percent in 2022 to 9.4 percent in 2023, an increase of 8.6 percentage points. Likewise, the percentage of 'proficient' students more than tripled, showing an increase of 8.7 percentage points, from 3.8 percent in 2022 to 12.5 percent in 2023 (table 3.15).

Positive growth was also reflected in the 'approaching proficiency' level, with an increase of 6 percentage points from 2022 to 2023. This upward shift indicates that an increasing number of students are moving to achieving proficiency in science literacy (table 3.15).

These results reflect a shift in science literacy. Sixteen percent of these students who were in their second-year in 2022 were approaching proficiency or higher in science literacy. A year later, the sampled third-year students showed significant improvement with the figure rising to 39 percent. This translates to an increase of 23 percent.

Simultaneously, there was a decrease in the percentage of students in the lower proficiency levels.

These shifts are evident at the school level. Nabango Community SHS (100.0 percent) and Walewale Vocational Technical Institute (85.5 percent), initially had the highest proportions of 'emerging' students in 2022. In contrast, there has been a notable decline in the proportion of emerging students in these schools in 2023 to 31.6 percent and 62.9 percent respectively.

Nonetheless, while these improvements are promising, there is still room for growth. The proportion of 'highly proficient' students, although increased, remains relatively low across the SETP schools, underscoring the need for initiatives aimed at nurturing top performers in science literacy. Furthermore, the 'emerging' and 'developing' categories, although decreased, still represent a majority of students, highlighting the need for sustained efforts and customised interventions in the SETP schools.

This consideration gains even more importance as these third-year students approach their WASSCE, of which science is a compulsory subject.

Some science teachers in the SETP schools estimated that between 30 to 40 percent of their third-year students would pass the WASSCE science exams with at least a C6[8] grade. When probed further about their plans for improving the success rate for the remaining majority of students, these teachers detailed a multi-level approach. They are planning to organise remedial lessons in science to fortify the students' understanding and are working diligently to ensure the curriculum's completion. Moreover, they are taking their students through past WASSCE science exam questions, providing them with practical approaches to solving these questions and equipping them with the necessary tools and strategies to excel in their forthcoming examinations.

To further validate the improvement in the performance of the current third-year students, we compare their results in 2023 with those of third-year students who were assessed in 2022 as part of the baseline survey. These third-year students were not exposed to the comprehensive interventions provided to the third-year students in the SETP schools. As can be seen in table 3.16, there are considerable differences in science literacy skills between the two groups of third-year students. On the one hand, higher percentages of the SETP students were in the two highest categories of science proficiency. On the other hand, compared with the non-SETP students a smaller percentage of the SETP students were in the two lowest categories of proficiency.

Table 3.16 Science literacy performance comparison: Intervention participants in the third-year (2023) versus. non-participant third-year students assessed in 2022 - (percent)

	Third-year students (SETP intervention participants) results	Third-year students (i.e., non-SETP intervention participants who completed in 2022) baseline result	Difference
Highly proficient	9.4	0.9	8.5
Proficient	12.5	4.3	8.2
Approaching proficiency	17.2	12.2	5
Developing	24.6	34.0	-9.4
Emerging	36.3	48.7	-12.4
N	680	353	

Table 3.17 presents a comparison of the science literacy performance between the current second-year students in SETP schools and the baseline results of second-year students in these same schools in 2022. The analysis reveals notable differences in the proficiency levels achieved. As can be seen in table 3.17, there are considerable differences in science literacy skills between the two groups. On the one hand, higher percentages of the current second-year students were in the two highest categories of science literacy proficiency. On the other hand, compared with the second-year students assessed at baseline in 2022, smaller percentage of the current second-year students were in the two lowest categories of proficiency.

[8] The WASSCE grading system starts from A1 to F9. A1 is the highest level of grading and is defined as excellent while F9 (fail) is the lowest. The scoring criteria for A1 is 80 – 100 percent. That of C6 is 50 – 54 percent and is defined as credit. This is the minimum required grade to enter a tertiary institution.

Table 3.17 Science literacy performance: Intervention participants now in second-year (first year at 2022 baseline) vs. 2022 baseline results of second-year students – (percent)

	Results for current second-year Students (SETP Intervention Participants)	Baseline results for second-year students assessed in 2022	Difference
Highly proficient	6.4	0.8	5.6
Proficient	10.9	3.8	7.1
Approaching proficiency	25.6	11.2	14.4
Developing	23.3	30.5	-7.2
Emerging	33.8	53.7	-19.9
N	532	786	

3.5.6 The impact of study duration on students' science literacy performance

Table 3.18 presents an analysis of the impact of study duration on students' science literacy. The table includes the average science literacy scores and the percentage of students classified as top performers (proficient or higher) in science literacy, based on the number of hours dedicated to studying science during their personal study time. The number of hours spent studying is estimated and self-reported.

There is a positive correlation between number of hours SETP students spend studying science and their respective mean scores in science literacy. The number of hours spent studying science was also a strong predictor of performance. The analysis revealed that an additional hour spent studying science was associated with a 0.4 unit increase in science literacy performance.

Students who dedicated 8 or more hours per week to studying science emerged with the highest mean score of 57.4. Furthermore, 29 percent of these students were categorised as top performers (proficient or higher) in science literacy.

Nearly 90 percent of students assessed in science devoted only four hours or fewer per week to the study of science outside their classroom. By way of comparison, over half of all students devoted more than four hours per week to the study of reading and mathematics.

Table 3.18 Students' mean science literacy performance by hours spent studying science

Hours spent studying science	Mean literacy score	% of students that are top performers (proficient or higher) in science literacy	N
Less than 2 hours a week	43.7	17.5	435
2-4 hours a week	55.8	31.5	324
5-7 hours a week	52.8	28.3	46
8 or more hours a week	57.4	29.2	48

3.5.7 Students' performance in the different aspects of science literacy

The assessment of proficiency in science literacy covers three domains (i.e., context, competencies, and knowledge). Table 3.19 provides the domain analysis of the science literacy of students. As shown in the table, there was a measurable improvement in most aspects of science literacy between 2022 and 2023.

Table 3.19 Students' performance in different aspects of science literacy (mean percent)

	Overall	
	Survey 2022	**Survey 2023**
Contexts		
Local/National/Social	52.5	57.0*
Global (Life across the world)	49.5	53.6*
Competencies		
Identify scientifically oriented issues	40.5	44.8*
Explain phenomena scientifically	34.0	37.9*
Use scientific evidence	22.3	21.4
Knowledge domains		
Knowledge of science (physical, living and technology systems, etc.)	40.3	44.8*
Knowledge about science (scientific inquiry and explanations)	29.3	31.3
Cognitive demand		
Low	55.8	59.8*
Medium	33.1	36.3

*p≤0.05

In the 'context' domain, students showed an enhanced understanding of both local/national/social and global contexts. There was a 4.5 percentage point increase in the local/national/social context, from 52.5 percent in 2022 to 57.0 percent in 2023, and a 4.1 percentage point rise in understanding global contexts, from 49.5 percent to 53.6 percent.

Progress was also noted in the 'competencies' domain, which measures students' abilities to identify scientifically oriented issues and explain phenomena scientifically. An increase from 40.5 percent to 44.8 percent was observed in the ability to identify scientifically oriented issues and an increase from 34.0 percent to 37.9 percent in the ability to explain phenomena scientifically. However, the ability to use scientific evidence saw a slight decrease, moving from 22.3 percent to 21.4 percent, indicating an area for further focus and development in the coming years.

The analysis at the school level highlights the variation in performances. Bolgatanga SHS and Bosome SHS school demonstrated notable performance across the different aspects of science literacy.

3.5.8 Modelling student performance in science literacy – multiple regression analysis

In a bid to improve understanding of the factors influencing science literacy among SETP students, a comprehensive multiple regression analysis was conducted. The variables examined included some demographic characteristics of students such as students' age, remedial class attendance, having a desk at home for studying, having a science textbook at home for studying, and hours spent studying science (see table 3.11).

Table 3.20 Output of multiple linear regression of science literacy assessment

Characteristics	Coefficient (Sig*)	95% confidence interval
Age of student	-0.553	-1.316, 0.209
Sex of student (Ref: Female)	-6.703*	-9.208, -4.197
Grade of student	1.790	-0.812, 4.394
Remedial class attendance	1.884	-0.609, 4.376
Have a desk at home for studying	8.314*	5.769, 10.859
Have a science textbook at home for studying	1.621	-0.936, 4.178
Number of hours studying in a week	0.354*	-1.283, 0.575
Have books in the household	0.36	0.188, 0.533

Sex of the student was a strong predictor of performance. The results show that female students obtain 6.5 percent less scores compared with their male counterparts.

Furthermore, the home environment was found to play a crucial role in student performance. Specifically, having a conducive study environment at home, such as a desk for studying, was associated with an 8-unit increase in performance.

The number of hours spent studying science was also a strong predictor of performance. The analysis revealed that an additional hour spent studying science was associated with a 0.4-unit increase in science literacy performance.

3.5.9 Qualitative findings on science Literacy

3.5.9.1 Factors contributing to improved proficiency scores in science literacy among SETP school students

After 14 months of implementing the SETP interventions in the 12 schools, quantitative results from the endline survey (section 3.5.4 to 3.5.8) reveal improvements in the science literacy.

Several factors emerge as key contributors to this positive trend, as reported by teachers, students, and headteachers within SETP schools. These insights provide a comprehensive understanding of the changes that have facilitated enhanced science literacy.

1. Improved approach to delivery of science lessons

Insights from the qualitative interview revealed that one of the primary contributing factors to improved science literacy proficiency scores among SETP students has been an innovative change in the teaching methods used by science teachers in SETP schools. This transformation has been largely driven by the PLC sessions that have been established as part of the SETP interventions.

From the weekly PLC sessions, science teachers have not only shared their individual teaching strategies but have also adopted a new array of tools and methods in delivering their lessons. This includes the effective use of ICT, the strategic formation of study groups, the execution of interactive assessment techniques, and the incorporation of multimedia resources into their lessons.

For instance, at Ogyeedom Community SHS, teachers have begun using projectors and other ICT tools in their lessons. One physics teacher from the school shared, *"Now, I use videos from YouTube to explain complex physics concepts like electromagnetism. I've seen that when the students see these concepts visually and in motion, they understand them better. They can see the laws of physics in action."* The integration of these technologies has elevated the teaching quality and has helped bring the abstract concepts of science to life.

Students too have responded positively to these pedagogical changes. One student explained, *"Our science classes have become more interactive now. Our teachers use pictures, diagrams, and videos to explain the concepts. This helps us to grasp the idea quickly and remember it for longer. It's not just about reading from the book anymore, and I think that's really cool."*

The improved approach to delivering lessons has also led science teachers to promote student-centred learning, focusing on provoking thought and facilitating discussions rather than merely disseminating information. This change has made science lessons more engaging, and students more actively involved in their learning process.

2. Remedial lessons in English, focusing on reading and understanding scientific texts

When the SETP interventions were introduced in 2022, the schools assessed their students' proficiency in reading, mathematics, and science. This assessment revealed a crucial obstacle to the students' academic performance - a poor foundation in English. Recognising that this fundamental weakness was affecting the students' understanding of other subjects, including science, the SETP schools decided to implement targeted remedial English lessons.

Reflecting on this experience, the head of science department at Walewale Technical Vocational Institute noted, *"Our initial assessment shed light on a pervasive issue. Our students were struggling with scientific concepts not because they couldn't grasp the science, but because they were struggling with English. This is because of their foundation at the basic school level. Most of them came here with poor results. In fact, we have students here with aggregate 36, 40 etc. This realisation guided us towards a solution that could provide a long-lasting impact on their learning journey - remedial English lessons."*

This approach was not simply about improving English language proficiency; it was thoughtfully tailored to enhance the relationship between language and science. Specific topics were designed to support the reading of scientific materials, thus empowering students to improve understanding of scientific language, terminology, and complex concepts.

Science teachers across SETP schools have witnessed the transformation first hand. For instance, a teacher from Bosome SHTS stated, *"We've noticed that the students can now engage better in class discussions and grasp scientific concepts much more efficiently since we introduced the English remedial lessons. The positive impact is evident in their improved science literacy scores. I and my colleagues assess the students after each lesson. When we compare their results to a year ago, it has really improved. I think it is because they are able to read and understand better."*

Students have also appreciated the benefits of these remedial lessons. As one student shared, *" Since I started the class, I find it interesting reading my science book. . I like reading story books so I took it like I am reading story books."*
Another student said: *" It has helped me in my performance. I can say that the time that we were not having extra classes, my performance at the end of terminal exams was not good. I can see that it has changed since we started the lessons. I can see that I have performed very well in some respects or in some subjects due to those extra classes. "*

3. Improved supervision of students and teachers

Insights from headteachers of the SETP schools revealed that one of the key objectives in their SIP is to improve student discipline and teacher attendance. The headteachers indicated that they organised a meeting with their staff and agreed on the various activities to achieve this objective. They further indicated that they agreed to implement robust supervision of the students and teachers. For students, this supervision does not include only their learning but covers all aspects of the students' lives.

For instance, the assistant head academic of Walewale Technical Vocational Institute indicated that the school's leaders work hand in hand with teachers to create a systematic supervision schedule. Each day, a group of teachers is assigned to monitor students during their personal study hours, ensuring that every student is focused on their academic tasks. A science teacher from the school described this approach as having a profound impact on students' study habits. He said, *"We have been asked to monitor their learning very closely. So, me, I will come to campus during prep hours and be walking around the corridors. When I see a student loitering around, I ask them to explain. In fact, they have all realised that we are doing this to help them pass their exams. So, they come to prep, they sit in their class, open their book and read. Even on weekends, you will see students coming to the campus to learn. You wanted to know whether this is improving their performance? Of course, when we mark their exercise, we see that they are improving. Also, their contribution in class has really improved. We've noticed a marked improvement in students' dedication to their personal studies since the inception of this supervision strategy. They seem more organised, disciplined and attentive to their study routine."*

Students too have noticed the change in supervision in their schools. A student from Benso SHTS echoed this sentiment, stating, *"I will say that, since you do not want to be punished, you will always stay in class and because there is high supervision in school, the headmaster will come to the class unaware whilst the teacher is teaching, and since the teacher wouldn't like to be found not doing his/her job, the teacher is always alert. The teachers are always coming to class and that is helping us in our academics. Because, at first you would rather go and look for them at the staff common room. But now since there is high supervision, the teacher does not know when the head will come to his/her class. "*

Another student from Bolgatanga SHS indicated that *"The headmaster, they are too strict that all the time, they do go round to supervise. All the time. They make sure that any teacher that is not there, they will just pen down the name so that is what they have been doing. Very strict supervision always. And they do chase people. Headmaster will chase people from the common market. Sometimes, he goes around chasing people to come to class. Go around during preps time to make sure that every student is seated and then likewise the Academics senior housemaster, in fact all those there, they do come around to supervise. "*

4. Student motivation

The headteachers and teachers of the SETP schools revealed that they have established award schemes aimed at fostering a culture of academic excellence. These schemes serve as a form of motivation and recognition for the best performing students, particularly in the field of science. According to some science teachers in the SETP schools, these award schemes have been pivotal in sparking a competitive spirit among the students and encouraging them to strive for higher proficiency in science literacy.

For instance, the headteacher of Gambaga Girls SHS stated that the school initiated an annual award ceremony in which students who excel in courses including science are rewarded.

A science teacher from the school remarked, *"Ever since the inception of the awards, we've noticed a rise in enthusiasm and engagement during science lessons. Students seem more eager to understand, participate, and excel."*

The head of the science department at E.P. Agriculture SHS also indicated that the school has adopted a similar approach but with a unique twist. Instead of an annual ceremony, the school recognises and rewards top-performing science students each semester. The recognition includes the recognition of students during general assembly and praising them in front of all students, giving them some tokens such as textbooks and other academic items. This continuous recognition keeps the students motivated and engaged with their science lessons. A student from the school said, *" We all came here together so if our results are pasted on the notice board and you see your mate at the first position, the way some of the teachers will praise him, it will even motivate you to learn. "*

Another student from Bolgatanga SHS also stated that *"At the end of every semester they will just take a particular day, call us and award the best performing students. So, you seeing your colleagues taking the award, you too you will try to improve more so that next time you will be the one to take it. It is also good "*

The introduction of award schemes in SETP schools has brought about a renewed vigour and commitment to academic excellence among students. These rewards and recognitions have created an environment of healthy competition, increased student motivation, and ultimately leads to improved proficiency in science literacy.

5. Provision and use of teaching and learning resources (TLRs)

Insight from the SETP school headteachers and teachers revealed that the SETP schools developed objectives centred around teaching and learning; this included the purchase of TLRs for lesson delivery, particularly science lessons. According to the headteachers, the SETP schools conducted a needs assessment to identify the TLRs needed in their schools and then purchased them.

During the FGD with the students, the students gave examples of TLRs that their teachers are using to deliver lessons. For instance, in Ogyeedom Community SHS, the students indicated that their teachers use projectors and laptops to show videos to explain concepts. They display pictures and diagrams during the lesson. According to the students, this visual approach has made learning more interactive and engaging, helping them to grasp complex scientific concepts more easily.

In Bolgatanga SHS, the students indicated that their teachers take them to the science lab to use the computers to see practical examples of the lessons being taught. This information from the students was collaborated by the teachers in Bolgatanga SHS. The teachers indicated that they have been able to create interactive lessons using computers and projectors.

The teachers further indicated that they have been created their own TLRs using materials such as cardboard and even leveraged the natural environment to explain certain concepts. For instance, a biology teacher in Benso SHTS stated that during a biology lesson, she took her students outside to observe plant structures directly instead of drawing it on the board. She further stated that her students were very happy after the lesson and when she assessed them orally, they answered all the questions.

These innovative approaches to teaching, facilitated by the use of TLRs, have transformed the learning experience for students in the SETP schools, leading to their improvement in science literacy. Below are some qualitative verbatims:

"With the support of SETP, we've been able to acquire essential teaching and learning resources. From projectors to laptops, these tools have become a critical part of our lesson delivery, especially for science subjects. They allow us to use videos, pictures, and diagrams to explain complex concepts, making learning more interactive and engaging for our students."

"We've taken our teaching approach a notch higher with the use of computers and projectors in our science lab. It's not just about theory anymore; we can show our students practical examples of what they're learning. This interactive method of teaching has been a game-changer in our school."

"It's amazing what you can do with some creativity. Apart from the standard teaching resources, we've been able to create our own using materials like cardboard. Sometimes, we even use the natural environment to teach our students. For instance, in a recent biology lesson, we stepped outside the classroom to observe plant structures directly. The students loved it, and they aced the oral assessment afterwards."

"The use of these teaching and learning resources is revolutionizing the way we teach and the way our students learn. It's not just about reading from textbooks; we're bringing lessons to life, making them more relatable and engaging. And the results are evident – our students are improving in their science literacy."

3.9.7.2 Strategies being adopted by SETP school science teachers to improve science literacy among lower proficiency students

Despite the overall improvement in science literacy among the SETP school students, some 24 and 35 percent of the students are developing and emerging in science literacy, respectively. During the interview with the science teachers from the SETP schools, they outlined the strategies they will employ to support students with lower proficiency levels in science, with the intent to help these students improve their understanding and application of scientific concepts. Here are the plans they have put forward:

Remedial lessons in science

The teachers plan to conduct remedial lessons in science focusing on topics that students find challenging. These lessons would be more intensive and personalised, allowing for one-on-one attention and feedback from the students. For instance, a science teacher from Ogyeedom Community SHS indicated that *" As for the students who we identified as still struggling in science, we have plans to organise remedial classes for them. We will hold these classes between 4 to 5pm, at least 3 times a week. My HoD said we should treat topics from form 1, starting from the beginning. We are more concerned about those in the final year now, we want to start solving the past WASSCE questions with them. We will teach them how to properly answer these questions. Then explain the concepts to them. We will try and guide them to pass their exams this year.*

Peer tutoring

The SETP school science teachers also intend to pair students who are struggling with those who excel in science. The teachers hope to create a supportive learning environment. They believe that this method will help lower proficiency students catch up under the guidance of their peers, enhancing understanding through collaboration. A science teacher from Nabango said *"We had a departmental meeting and agreed that one of the ways forward is to get the students to learn from each other. We are going to pair them together, we know those who are performing well in science, we have their end of term results. One student who is performing well and another who is not, then we ask them to be learning together, the one who is performing well should be teaching the other student. We will be monitoring how they go about it. When we spoke to some of them, they said that their colleagues are able to explain some of the concepts to them better. So, we think we should adopt this strategy. Of course, we will continue to teach very well, but this will also help."*

Hands-on experiments and field trips

The SETP school science teachers believe in the importance of learning through doing. They plan to organise more lab sessions and field trips where students can observe and participate in the application of scientific concepts in real-world situations. During the interview with some heads of the schools, the heads also confirmed the importance of field trips and indicated that they have not taken their students for these trips in while because of the financial implication. They also complained about their lack of science laboratories but indicated that they will make do with what they have for now. The heads further indicated they are going to put in efforts to organise at least one each year. Below are some quotes: *" Learning is not just in the four corners of our classrooms. We must expose our students to the world around them, let them touch, see, and feel science in action. Yes, the problem is money, but we will try our best. We know how important this thing is."*

" Hmm, the lab that is there, if you enter, you can see that it is not fully equipped. It is not even big. We just adopted that small room as a lab. When you go to other big schools, they have big labs. What can we do. We will only try and use what we have to help them understand the lesson. So, we are on it. We will organise more practical for them. I am sure that will open the minds of some of them to better understand the concept. but we persevere, striving to provide our students with practical experiences. It's not an easy task, but we are committed to making it work."

Regular progress tracking and feedback

The SETP school science teachers also indicated their intent to closely monitor the progress of each student through regular assessments. The teachers indicated that this would help them to identify areas where their students might be struggling and provide personalised feedback to guide their improvement.

Below are some qualitative verbatims from interviews with the headteachers and teachers:

"Teaching isn't just about imparting knowledge. It's equally important to monitor how well each student grasps the concepts we teach. So, we conduct regular tests to track their progress. If we notice any areas of struggle, we provide insightful advice to help them improve. For these students who are still struggling, we will closely monitor and track their progress, one-on-one."

We understand that learning isn't a straightforward process; there can be hurdles along the way. Our job is to identify these challenges. That is why we have decided to keep an eagle eye on each student's progress.

Then we can identify areas of difficulty and provide guidance to help them excel. The students themselves know me already, I always watch them closely."

"Every student is unique, and so is their learning journey. We remain vigilant about our students' progress and conduct regular assessments to ensure they're on the right track. If a student is struggling in a certain area, we will provide feedback to help them move forward. We are fully committed to seeing every student succeed, regardless of the challenges they face."

3.6 Evaluation of mathematics literacy assessment

3.6.1 Mathematics literacy assessment

Competence in mathematics assists students in recognizing the role that mathematics plays in the world and in making well-founded judgments and decisions needed to be constructive, engaged, and reflective citizens.

3.6.2 The framework for assessing mathematics literacy

Mathematical literacy includes making mathematical deductions and applying mathematical concepts, procedures, facts, and tools to describe, explain and predict phenomena (please see the mathematics item framework attached as annex 1). Such literacy helps people to identify and understand the role that mathematics plays in the world and to make the well-founded judgments and decisions required in life.
The literacy framework for mathematics comprises four interrelated aspects:

- the content area in which tasks are embedded
- the contexts involved
- the competencies/processes used and
- the cognitive domain that students need to apply

Content areas:
The mathematics literacy framework classified content area along

- Cover quantity
- Space and shape
- Change and relationships
- Uncertainty and data.

Contexts
The mathematics literacy framework identified context to include:

- Personal
- Occupational
- Societal and scientific.

Competencies/processes include:

- Formulating situations mathematically
- Employing mathematical concepts, facts, procedures, and reasoning
- Interpreting, applying, and evaluating mathematical outcomes

Cognitive domain:

- Low
- Medium
- High.

For both 2022 and 2023, the assessment of mathematics literacy items was identical and

included 40 items, of which 36 were multiple choice and 4 were open-ended. Students were allowed 90 minutes to complete the assessment.

3.6.3 Proficiency levels for mathematics literacy

As discussed in previous sections, student performance in the assessments is reported on a scale. The scale is divided into levels of proficiency that indicate the kinds of tasks that students at those levels are capable of completing successfully. Table 3.21 illustrates the range of mathematics achievements covered by the assessment instruments in mathematics and describes the skills, knowledge and understanding that are required at each level of the mathematics scale.

Table 3.21 Proficiency levels for mathematics literacy

Level of proficiency	Scores	Characteristics of tasks
Highly proficient	80 - 100%	Highly proficient students can conceptualise, generalise, and utilise information based on their investigations and modelling of complex problem situations, and can use their knowledge in relatively nonstandard contexts. They can link different information sources and representations together and flexibly translate among them. Students at this level are capable of advanced mathematical thinking and reasoning. These students can apply this insight and understanding, along with a mastery of symbolic and formal mathematical operations and relationships including formal proofs, and to develop new approaches and strategies for attacking novel situations. Students at this level can reflect on their actions and can formulate and precisely communicate their actions and reflections about arguments and the appropriateness of these to the original situation through high level mathematization.
Proficient	68 - 79%	At this level, students can develop and work with models for complex situations, identifying constraints and specifying assumptions. They can select, compare, and evaluate appropriate problem-solving strategies for dealing with complex problems related to these models. Students at the proficient level can work strategically using broad, well-developed thinking and reasoning skills, appropriately linked representations, symbolic and formal characterisations, and insight pertaining to these situations. Students at the proficient level have begun to develop the ability to reflect on their work and to communicate conclusions and interpretations in written form.
Approaching proficiency	54 - 67%	Approaching proficiency students can execute clearly described procedures, including those that require sequential decisions. Their interpretations are sufficiently sound to be a base for building a simple model or for selecting and applying simple problem-solving strategies. Students at this level can interpret and use representations based on different information sources and reason directly from them. They typically show some ability to handle percentages, fractions, and decimal numbers and to work with proportional relationships. Their solutions reflect that they have engaged in basic interpretation and reasoning.

Developing	40-53%	Developing students can interpret and recognise situations in contexts that require no more than direct inference. They can extract relevant information from a single source and make use of a single representational mode. Students at this level can employ basic algorithms, formulae, procedures, or conventions to solve problems involving whole numbers. They are capable of making literal interpretations of results.
Emerging	39% and below	Few emerging students can demonstrate the ability and initiative to use mathematics in simple life situations. These students may not be able to make meaningful connections between mathematical concepts.

3.6.4 How students performed in mathematics literacy

As seen in table 3.22, the SETP students' performance in mathematics literacy is not as significant as the other assessment areas. Across the 12 schools, 32.3 percent of the students are approaching proficiency or higher in mathematics literacy in 2023 compared with 29.9 percent in 2022 (table 3.22).

Surprisingly, second-year students have shown better performance in mathematics literacy than third-year students in 2023 (table 3.23). The SETP mathematics teachers claimed that this is a result of indiscipline among third-year students. They further explained that third-year students started absenting themselves from school after they registered for the WASSCE. They further added that if the WASSCE mathematics examination were written as of the time of the data collection, only 10-20 percent of the third-year students would pass with aggregate A1 to C6.

When examining school level performance, Bolgatanga SHS stands out, consistently outperforming other SETP schools in mathematics literacy (table 3.22).

The proportion of top performers in mathematics literacy has also seen a modest increase of 2 percent in 2023.

There is also an increase in the percentage of 'developing' students in mathematics, rising from 41.4 percent in 2022 to 45.2 percent in 2023. This increase is particularly pronounced in category C schools, with some of the category C schools (Mangoase SHS, Ziavi Community SHTS and E.P. Agriculture SHS) showing especially significant increases (table 3.22). This increase in developing students could be attributed to a reduction in the number of emerging students, which fell from 29 percent in 2022 to 23 percent in 2023. This reduction is especially significant among female students, second-year students, and category C schools. However, while this reduction is a positive development, it's important to note that many of these students have transitioned to the 'developing' proficiency level, which is still a lower proficiency level. This implies that while progress has been made, there is still a need for further support and intervention to move these students to higher proficiency levels.

One notable case is Gambaga Girls SHS, where the proportion of emerging students has decreased significantly, with many of these students transitioning to the 'developing' level. Further examination of the data reveals that the number of developing students in this school has increased from 41 percent in 2022 to 52 percent in 2023 (table 3.23).

Overall, while there have been improvements in proficiency levels of SETP students in mathematics literacy, the amount of change is small, and it is challenging to discern whether these improvements are a direct result of the interventions or attributable to other factors.

Table 3.22 Percentage of students at different levels of mathematics proficiency (survey 2023) by school

	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023
Benso SHTS	2.2	0.0	14	8.6	30.1	31.4	40.9	37.1	12.9	22.9
Bolgatanga SHS	7.4	10.4	10.6	11.7	30.1	29.7	36.3	36.0	15.6	12.3
Bosome SHS	1.5	2.4	5.2	5.5	25.9	21.3	51.9	52.0	15.6	18.9
E.P. Agriculture SHS	0	0.0	1.4	4.7	19.4	11.6	38.9	51.2	40.3	32.6
Gambaga Girls SHS	0	0.0	0	1.0	9.8	13.4	40.6	51.6	49.7	34.0*
Lambussie Community Day SHS	0	0.0	8.3	6.5	31.3	39.1	39.6	43.5	20.8	10.9
Mangoase SHS	1.7	0.0	6.2	4.8	24.7	19.3	38.8	53.6*	28.7	22.3
Nabango Community SHS	0.0	0.0	0.0	3.2	25	29.0	37.5	25.8	37.5	41.9
Ogyeedom Community SHTS	0.0	0.0	0.0	8.3	37.5	22.2	31.3	44.4	31.3	25.0
Walewale Vocational Technical Institute	0.0	0.0	0.9	1.2	7.4	14.9	50.9	50.6	40.7	33.3
Zabzugu SHS	1.4	0.5	0.7	1.6	17.7	23.4	42.6	45.7	37.6	28.8
Ziavi Community SHTS	0.0	0.0	0.0	10.0*	21.6	17.5	37.8	52.5	40.5	20.0*
Overall	2.3	3.1	4.7	6.0	22.9	23.2	41.4	45.2	28.7	22.5

**p≤0.05*

3.6.5 STEP students' attainment of the different proficiency levels in mathematics literacy

Table 3.22 shows the distribution of students across the five proficiency levels.

Table 3.23 Percentage of students at different levels of mathematics literacy

	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023
Sex										
Male	4.0	5.3	6.4	8.2	27.1	26.1	39.4	41.6	23.1	18.8
Female	0.6	1.2	3.1	4.2	19.1	20.7	43.3	48.3	33.9	25.6*
Level of student										
Form 2	2.4	3.2	3.9	5.9	21.2	25.4	42.2	44.2	30.3	21.3*
Form 3	2.0	2.9	6.6	6.2	27.3	21.4*	39.4	46.0*	24.7	23.5
School category										
Category A	7.4	10.4	10.6	11.7	30.1	29.7	36.3	36.0	15.6	12.3
Category B	1.8	1.9	8.8	6.2	27.6	23.5	47.4	48.8	14.5	19.8
Category C	0.7	0.1	2.4	3.6	18.2	20.3	41.4	48.5	37.4	27.5*
Overall	2.3	3.1	4.7	6.0	22.9	23.2	41.4	45.2	28.7	22.5

*p≤0.05

Highly proficient

The data presented in table 3.23 shows a slight increase in the proportion of SETP students who are highly proficient in mathematics literacy, from 2.3 percent in 2022 to 3.1 percent in 2023. These highly proficient students can conceptualise, generalise, and utilise information based on their investigations and modelling of complex problem situations and can use their knowledge in relatively nonstandard contexts. They can link different information sources and representations together and flexibly translate among them. Students at this level are capable of advanced mathematical thinking and reasoning.

In 2022, 2.3 percent of the SETP schools had students attaining this level, particularly Bolgatanga SHS where 7.4 percent of the students were highly proficient in mathematics literacy. This has increased to 10.4 percent in 2023 (table 3.22).

Proficient

Marginal increases were also noted for the proficient level. In 2022, only 4.7 percent of the SETP students were proficient in mathematics literacy across the 12 schools. This has increased to 6 percent in 2023 (table 3.22).

These proficient students can develop and work with models for complex situations, identifying constraints and specifying assumptions. They can select, compare, and evaluate appropriate problem-solving strategies for dealing with complex problems related to these models. Students at the proficient level can work strategically using broad, well-developed thinking and reasoning skills, appropriately linked representations, symbolic and formal characterizations, and insight pertaining to these situations.

Approaching proficiency

Just as with the higher proficiency levels, the improvement in the share of students approaching proficiency

in mathematics literacy across the 12 SETP schools was also very modest. Students approaching proficiency can execute clearly described procedures, including those that require sequential decisions. Their interpretations are sufficiently sound to be a base for building a simple model or for selecting and applying simple problem-solving strategies. Students at this level can interpret and use representations based on different information sources and reason directly from them.

The significant decrease observed among third-year students approaching proficiency in mathematics literacy is indeed concerning, especially considering that these students will sit the WASSCE examination in July 2023.

In response to this issue, mathematics teachers from the SETP schools have expressed concerns about the mathematics proficiency of their third-year students and their potential performance on the WASSCE. To address these concerns, the teachers plan to organise urgent remedial lessons focused on mathematics.

Furthermore, during a FGD, the third-year students themselves expressed worries about mathematics. Many students identified mathematics as their least favourite subject, attributing this to the approach used in its delivery. However, they acknowledged a recent change in the delivery approach, noting that they now feel more comfortable asking questions and receiving answers from their teachers. Some students also observed that their teachers are no longer focusing solely on the highly proficient students but are making efforts to ensure that lower proficiency students also understand the lessons.

In addition to these classroom changes, the students have taken initiative by forming study groups with peers who are slightly better in mathematics. Within these groups, they plan to review old topics, attempt to solve past WASSCE questions, and cover as many new topics as possible. These efforts by both teachers and students highlight a collective commitment to improving mathematics literacy performance ahead of the crucial WASSCE examination.

Developing

There has been an increase in the proportion of developing mathematics students in the 12 SETP schools in 2023 (45.2 percent) compared with 41.4 percent in 2022. This increase is more significant among the third-year students, increasing from 39.4 percent in 2022 to 46 percent in 2023 (table 3.23). Again, there has been an increase of 5 percent in the proportion of female students who were developing in mathematics literacy, from 43.3 percent to 48.3 percent. An analysis of the data showed that this increase is a result of the transition of some emerging students to developing, particularly students in Gambaga Girls SHS (table 3.22).

Emerging

Results in table 3.23 also show a decrease of 6.2 percent in the share of students who were emerging in mathematics in 2023 compared with 2022. Significant decreases were noted for second-year students, female students, and students in category C schools. This decrease suggests that a significant proportion of these students have moved from the emerging level to the developing level in their mathematical literacy.

Few emerging students can demonstrate the ability and initiative to use mathematics in simple-life situations. Therefore, this shift indicates that few students are stuck at this initial stage. However, while this is a promising development, it is important to bear in mind that these students are still in the early stages of their mathematical education. The developing level, while an improvement over emerging, still signifies that these students have a limited grasp of the subject and often struggle with complex problems.

Therefore, while this decrease in the number of emerging students is a positive step, it should be seen as the beginning of a long journey. Further support and interventions will be needed to help these students continue their progression and reach higher levels of proficiency in mathematics literacy.

Progress in SETP students' mathematics literacy: A comparison between intervention participants and baseline performances

The data presented in table 3.24 provides a comparative analysis of the mathematics literacy performance of third-year SETP students in 2023 against their baseline results from 2022, before the intervention.

Table 3.24 Mathematics literacy: Third-year students in (2023) versus third-year students in 20222 – percent

	Current third-year students' endline result (2023)	Second-year students baseline result (2022)	Difference
Highly proficient	2.9	2.4	+0.5
Proficient	6.2	4.1	+2.1
Approaching proficiency	21.4	21.0	+0.4
Developing	46.0	42.2	+3.8
Emerging	23.5	30.3	-6.8
N	682	895	

As seen in table 3.24, the performance of the current third-year students in mathematics literacy shows only marginal improvements when compared with their baseline results in 2022 when they were in their second-year. As seen in the table, there are no statistically significant changes. These results indicate that more needs to be done by the SETP schools to improve the mathematics literacy among students, especially for the current third-year students who are about to write their WASSCE examination.

Table 3.25 Mathematics literacy performance comparison: Intervention participants in third-year (2023) vs. non-participant third-year students assessed in 2022 – percent

	Third-year students (SETP intervention participants) results	Third-year students (i.e. non-SETP intervention participants who completed in 2022) baseline result	Difference
Highly proficient	2.9	2.0	0.9
Proficient	6.2	8.1	-1.9
Approaching proficiency	21.4	25.9	-4.5
Developing	46.0	39.4	+6.6
Emerging	23.5	24.7	-1.2
N	682	348	

Table 3.25 provides a comparative analysis of the mathematics literacy of third-year SETP students who participated in the intervention in 2023 against non-participant students assessed in 2022. Similar to those shown in the previous table, the 'differences' are not statistically different, again, emphasising what appears to be the modest effect of SETP's interventions, at least in mathematics.

Table 3.26 Mathematics literacy performance: Intervention participants now in second-year (first year at 2022 baseline) vs. 2022 baseline results of second-year students - percent

	Results for current second-year Students (SETP Intervention Participants)	Baseline results for second-year students assessed in 2022	Difference
Highly proficient	3.2	2.4	+0.8
Proficient	5.9	4.1	+1.8
Approaching proficiency	25.4	21.0	+4.4
Developing	44.2	42.2	+2
Emerging	21.3	30.3	-9
N	527	895	

An analysis of the mathematics literacy of second-year SETP students in 2023 and second-year students assessed in 2022 is presented in table 3.26. There were again no meaningful changes. Consistent with the findings just discussed, the analysis reveal that further efforts are needed to enhance SETP's effectiveness and support greater improvements in mathematics literacy.

3.6.6 The impact of study duration on students' mathematics literacy performance

The impact of study duration on students' mathematics literacy performance was analysed as seen in table 3.27. The table provides the mean mathematics literacy scores and the percentage of students that are top performers (proficient or higher) in mathematics based on the number of hours dedicated to studying reading during their personal study time. There is a weak but positive correlation (r = 0.169, p-value = 0.000) between the hours spent studying mathematics and students' proficiency in mathematics.

Table 3.27 Students' Mean mathematics literacy performance by hours spent studying mathematics

Hours spent studying mathematics	Mean score	% of students that are top performers (proficient or higher) in mathematics literacy	N
Less than 2 hours a week	44.2	2.4	164
2-4 hours a week	47.1	8.1	210
5-7 hours a week	47.3	8.5	295
8 or more hours a week	51.4	17.5	211

The correlation between study hours and performance is not straightforward. In some schools, students dedicating a moderate amount of time, such as 2-4 hours weekly, displayed surprisingly high proficiency levels. For instance, in Ogyeedom Community SHS, students studying mathematics for 2-4 hours a week achieved a mean score of 45.9 percent.

It is important to note that other factors such as the quality of study, teaching methods, and individual student abilities also influence students' performance. This suggests that while increasing study hours can potentially improve students' understanding and proficiency in mathematics, personal study should be complemented with effective teaching methods and quality study materials.

3.6.7 Students' Performance in the different aspects of the mathematics literacy

Table 3.28 provides an analysis of SETP students' performance in different aspects of mathematics literacy. Comparing the mean percentages from 2022 to 2023, reveal insights into the progress made by students in each of these areas.

Table 3.28 Students' performance in different aspects of mathematics literacy (mean percent)

	Overall	
	2022	**2023**
Content area		
Quantity	29.6	41.7*
Space and shape	40.6	58.1*
Change and relationship	34.6	51.6*
Uncertainty and data	41.3	53.4
Competencies/processes		
Formulating situations mathematically	30.5	45.2
Employing mathematical concepts, facts, procedures, and reasoning	25.5	43.2
Interpreting, applying, and evaluating mathematical outcomes	49.2	58.5
Cognitive domain		
Low	49.5	56.2
Medium	23.9	43.7
High	22.9	39.3

*p≤0.05

In terms of the content area, there have been some improvements in students' performance. The mean percentage for 'Quantity' increased from 29.6 percent in 2022 to 41.7 percent in 2023. Similarly, there were improvements in 'Space and Shape', and 'Change and Relationship.

The school level results as presented in table A2.9 in annex 2 further highlight the variation in performances. Certain schools such as Bolgatanga SHS demonstrated notable performance across the different aspects of mathematics literacy.

3.6.8 Modelling student performance in mathematics literacy – multiple regression analysis

To understand the factors influencing students'' performance in mathematics, a multiple regression analysis was conducted. The analysis considered several variables, including sex, age of the student, remedial class attendance, having a desk at home for studying, having a mathematics textbook at home for studying, number of hours studying in a week, has a calculator, student noticed improvement in teachers lesson delivery, student indicated that he/she is not good in mathematics (see table 3.29).

Table 3.29 Output of multiple linear regression of science literacy assessment

Characteristics	Coefficient (Sig*)	95% confidence interval
Age of student	0.116	-0.03, 0.262
Sex of student (Ref: Female)	-3.65*	-5.476, -1.824
Grade of student (Ref: Form 3)	-1.136	-2.967, 0.696
Remedial class attendance	0.36	-1.452, 2.172
Have a desk at home for studying	3.452*	1.545, 5.359
Have a calculator	-0.131	-2.142, 1.879
Have a math textbook at home for studying	1.706	-0.288, 3.7
Have books in the household	-0.063	-0.719, 0.592
Not very good in mathematics	2.046*	1.104, 2.988
Number of hours studying in a week	0.171*	0.038, 0.303

Student's sex had a significant effect on mathematics abilities. The results showed that female students obtained about 3.6 percent lower scores compared with male students.

The analysis revealed a positive association between having a study desk at home and mathematics proficiency. Students with a dedicated study space tended to have higher mathematics scores, suggesting that a conducive learning environment can positively impact mathematics skills.

The availability of a "mathematics textbook at home for studying" was examined to assess its impact on mathematics literacy performance. The analysis revealed that remedial class attendance had no significant effect on the scores obtained by the students.

The analysis revealed that students who believed they were not good in mathematics tended to have lower mathematics scores. This highlights the importance of self-confidence and self-perception in academic performance.

The analysis also revealed a positive correlation between the amount of time students spent studying and their mathematics scores. Students who dedicated more hours to studying mathematics-related materials demonstrated higher levels of mathematics proficiency.

3.6.9 Qualitative findings on mathematics literacy

3.6.9.1 Factors contributing to low proficiency scores in mathematics literacy among SETP school students

As seen from sections 3.6.4 to 3.6.8, there was no significant improvement in student performance in mathematics literacy in the SETP schools after a little over one year of implementation of the interventions. The qualitative findings therefore provide a deeper understanding of the factors contributing to low proficiency scores in mathematics among the SETP school students. These factors, are multifaceted and complex, ranging from teacher accountability to student discipline and confidence, the practicality of mathematics lessons, and students' fear of mathematics.

1. **Teacher Accountability**

Teachers play a crucial role in student learning outcomes. However, in the SETP schools, there seems to be some lack of accountability among mathematics teachers.

The teachers, instead of acknowledging their role in the students' learning process and taking steps to address the low proficiency levels, are shifting the blame onto the students. They attribute the poor performance to the students' prior academic foundation, suggesting that the students' weak proficiency levels stem from their basic school education. Below are some quotes:

"In sincerity, performance in mathematics is a problem because it is not as even, we teachers are expecting. Almost all of us are so surprised about the effectiveness of teachers when it comes to their lessons but it always appears when you do the evaluation because they will be giving them daily homework and then you mark in class, class activity but the performance which we realize that most of them lack the basics of mathematics, the fundamentals of mathematics and we had to also introduce the intervention program where students are taken through some of these. With performance, though there is an improvement, the percentage of students performing in mathematics is so low. You can go to a class, and you have one student getting above average performance and you can also see the majority of the class falling below performance. "

"Well, another factor is their fundamentals, their foundations which we also saw that some students…I wish I had some scripts somewhere which you can see students and then you will relate it to your lesson that you teach and the homework that you give. Their foundation is a key thing and that one we also look at it and it is actually a hell in our department (maths). "

"The problem is, or the challenge is, the children the school receives. Their level of understanding is very down. So, you put all your efforts in teaching, you do your best, but you don't see the results. So, sometimes you find yourself like, if I was teaching at Prempeh, at least there will be seeing me, the results will show that at least I have done something. But here is the case you are given children or students whose level of understanding is very down. Even when you speak English, is a problem for them to understand. So, how much more we are using the English to teach them. So, me that's just my problem. That's my challenge in the school. "

This lack of accountability is problematic for several reasons. Firstly, it absolves the SETP mathematics teachers of their responsibility to facilitate learning and improvement. As they blame their students and other colleague teachers, they avoid addressing the real issue - the need for effective teaching strategies and interventions tailored to the students' needs.

Secondly, this attitude can create a negative learning environment. If students feel that they are being blamed for their poor performance, rather than being supported to improve, it can impact their motivation and engagement in learning.

Thirdly, without taking accountability, the SETP mathematics teachers may miss opportunities for professional growth. Reflecting on students' performance can provide valuable insights into what teaching methods are working and where improvements can be made. However, the SETP mathematics teachers are quick to blame the students, hence overlooking these opportunities for self-improvement.

To address this issue, there needs to be a shift in the culture of teaching within SETP schools. The mathematics teachers should be encouraged to take responsibility for their students' learning outcomes. This could involve professional development programs focused on effective teaching strategies, student-centred learning, and intervention methods. Regular feedback and evaluation systems could also be implemented to help the SETP mathematics teachers identify areas for improvement and track their students' progress.

2. Student Discipline

According to insights from the mathematics teachers in the SETP schools, student discipline, particularly among third-year students, is a significant concern. They highlighted that irregular class attendance and late reporting when school reopens are common issues among these students. This lack of discipline and commitment to learning, they believe, is severely impacting the students' understanding and application of mathematical concepts. The teachers emphasised the importance of regular class attendance for continuous learning. They noted that when students miss classes, they lose out on critical lessons, discussions, and exercises that could enhance their understanding of mathematics. This often leads to gaps in their knowledge, which can significantly affect their performance in assessments and examinations.

Late reporting when school reopens, was another issue raised by the teachers. They indicated that this is most predominant among the third-year students. The teachers expressed concern that this lack of discipline is not only affecting students' academic performance but also hindering the development of important skills such as time management, responsibility, and self-discipline. They believe that these skills are crucial for academic success, personal development, and future career prospects. Below are some quotes from the SETP mathematics teachers

"And the fact is that we are now in our third week. I went to a class of about 25 only to count 6 of them. As for absenteeism I must say it is a regular thing. They report very late. As we are in school, we will not be able to rate even half of the student population currently. "

"I don't know whether you are aware of the fact that nowadays we don't cane so they think that they have the rights to do anything. They will be saying, even the school, I came here ...so, I think that aaah, so, you don't know why you are in school? It's for your own future. So, at times when you sit them down, we talk about that. But some of them I don't know whether it's from where they are coming from, maybe because they are taking care of themselves, they are grown-ups. We sat down to discuss a lot, but they are not listening. They sit at the canteen and don't do anything. They will sit there and talk saaa...

"I have been trying to organise extra classes. That is meeting them maybe weekends, assist them especially the weaker ones. One thing that I have to say is that, truly, those that you want to help them especially don't come. That is the truth. "

"I have informed the counsellor who has been speaking to them...last exams, somebody wrote it… and the whole objective, they didn't write anything. When I tried to find out form the students, they told me that they were told to go and cut down their hairs before the exams time. So, the whole objective, nothing. He didn't do anything on the objective sheet, and this is the theory that he wrote. How can he perform? "

To address these issues, the SETP mathematics teachers suggested that their schools need to enforce strict attendance policies and ensure that students understand the importance of regular attendance and punctuality. They also believe that parents and guardians should be more involved in instilling discipline and ensuring that their children attend school regularly.

3. Practicality of Mathematics Lessons

Insights from the SETP school students revealed that the practicality of mathematics lessons was a significant concern. They reported that until recently (i.e. last semester), the mathematics lessons were not practical, making it difficult for them to understand and apply the mathematical concepts being taught.

The students noted that the teachers often focused on top-performing students, leaving those who were struggling to understand the concepts on their own. They also mentioned that teachers did not answer questions adequately, which further hindered their understanding of the subject. This lack of individual attention and support can create a learning gap, with some students advancing while others are left behind.

Furthermore, the students pointed out that the lessons used to lack real-world applications of mathematical concepts. They expressed that understanding how these concepts relate to real-world situations can make the subject more interesting and easier to understand. Below are some quotes from the students:

"Okay some of the maths teachers when they come to class, they do not have that patience, some do insult and some if you ask questions, they will not even answer it for you to understand it well. If you come to class to teach and I don't understand and I ask questions and you insult me, you always make me feel discouraged."

" At first our mathematics teacher when he come to the classroom he always frown his face and so if he is teaching and you don't understand anything you are always afraid to ask questions but now that the PLC has come and he always go and there, they teach each other and they teach them how to handle the students, now if the teacher come, he don't always frown his faces and so it makes us students open to ask any questions that we don't understand. ."

" When we came at first, when the teachers were teaching, they didn't use any instruments for practical but now they are having materials for practical especially if you are doing maths or science and there is a practical we are supposed to do, there are instruments so we do it."

"Last semester they were not talking about the practical side but now they are much more focused about the practical side and when you go to the practical side and the theory side and so when you have both the practical and the theory and you are writing exams it just flows."

" I had problem with mathematics before. Because, at first, our madam was not using any diagram, but she stood in front of the board and wrote on them like that but now, we go out to find tin of containers and we cut them into shapes, and now we also use diagrams. Yes, she started using the containers and other things last term."

" I will say the whole concept of elective mathematics. When we came to form 1, we couldn't get any good foundation. Because of this, our teacher wasn't coming to class. We couldn't even finish a topic in the whole of form 1. So, when we got to form two, we were even running away from the subject. But now, we have met a certain man who is very good in math. And nowadays, we are performing better in math than in the other subjects."

" Yes, madam. At first, our maths teacher was really harsh on us but nowadays…after the PLC, he started being friendly. Sometimes when he asks us questions, we will be sitting there saying nothing. So, he will get angry and punish us but now, when he asks us question and he is not able to answer, he will just take it slow on us. He will not speak harshly on us."

" Yes. At first, the method that I used to solve mathematics was difficult for me but now the teachers have been teaching us how to solve math that will be easier for you to understand it by yourself. So, me, it has helped me in those things. "

Some students indicated that they have already started to notice some positive changes in the approach their mathematics teachers use to teach. They indicated that these changes started to manifest when the teachers started attending PLC sessions.

The students are therefore suggesting that their mathematics teachers continue on this trajectory and make the mathematics lessons more practical and relatable. They proposed that their mathematics teachers should incorporate real-world examples and practical applications of mathematical concepts into their lessons. Additionally, the students emphasised the need for their mathematics teachers to build on and continue to provide individual attention and support to all students, not just the top performers. They suggested that teachers should encourage questions and provide clear and detailed answers to ensure that all students understand the concepts being taught.

4. Fear of Mathematics

During the FGD, a recurring theme that emerged was a profound fear of mathematics among a number of students. This fear, as expressed by the students, was not a mere dislike or discomfort, but a deep-seated apprehension that seemed to affect their approach to the subject.

The students who expressed this fear did not do so lightly. They indicated that their fear was rooted in the perception that mathematics is an inherently difficult subject. This perception, it seems, is not based on a lack of understanding or ability, but rather on a belief that the complexity and abstract nature of mathematics make it a uniquely challenging field of study.

This fear of mathematics, as expressed by the students, has significant implications. It is leading to the students avoiding the subject (i.e., missing mathematics lessons as indicated by the teachers), resulting in a lack of practice and consequently, a lack of proficiency. Below are some quotes from the students.

" For now, I will say maybe maths because due to some little calculations but it is not that difficult, but I will say maths. It is not like finding difficult but sometimes the master teaches, you try to understand but sometimes you don't get all the concepts. Though he tries to explain but since the concept is not coming I always try to relax so that when he goes out, I can go to my colleagues so that if there is someone that understands it better than the person will explain it to me. But then getting to the house, you will be able to do the calculation but then getting to the final answer you have it wrong or something like that, that's the only problem that I have."

" I was not good at core maths. If the madam is teaching and you don't understand, if you ask the madam she will re-explain it to you and if you still don't understand the madam will tell you that maybe if she comes out you can come to her and learn more so you can understand or you go to some of your colleagues who understand."

"Madam, I fear maths. especially algebraic expression, hmmm… simultaneous equation. madam sometimes the "x" is…I don't really know how to say it but it was very hard for me to understand. Because the numbers and the alphabets were mixing, it was very difficult."

" Maths and physics. Yes, those are the two difficult subjects but now we are doing group work, so it is somehow better."

It's important to note that this fear is not insurmountable. With the right support, teaching methods, and mindset, the SETP students can overcome their fear of mathematics and develop not only proficiency, but also a genuine appreciation for the subject. However, this requires acknowledging and addressing the fear, rather than dismissing it or allowing it to go unaddressed.

3.6.9.2 Strategies being adopted by SETP school mathematics teachers to improve mathematics literacy among lower proficiency students

In response to the low proficiency scores in mathematics literacy among SETP school students, the mathematics teachers indicated that they are adopted several strategies to improve the situation. These include:

Adapting teaching methodology

The SETP mathematics teachers indicated that they are making conscious efforts to adapt their teaching methods to suit the needs of the students. They are moving away from a one-size-fits-all approach to a more tailored method that considers the unique learning styles and pace of each student. A mathematics teacher in Nabango SHS shared, *"I also do lesson monitoring which when I come for a lesson, I mark attendance and I use that attendance to motivate them. I tell them that I use that attendance as my project, meaning that the more you come to my class; it means you are active, and I will reward you."*

Another teacher mentioned, *"I think it will still go back to the same question because if I realize the student is not performing well, it means the student needs a different method of the teaching. It means I will change my methodology. And after that, I will assign a good student to handle or to help that particular student to go through the lesson. "*

The students have appreciated this approach, reporting that they feel more engaged and understood during mathematics lessons. They have noticed that the lessons are more responsive to their needs and that they are more likely to receive individualized support when they are struggling with a concept.

A student from Bolgatanga SHS shared, *" Our teachers help me, especially our maths teacher. He will always come and ask us to go to the board and solve some questions so that help me improve."*

Another student from Ogyeedom indicated that *" Let's say at first, whenever the teacher teaches, I don't get to understand but they going to the PLC meeting, for me, they teach so that I can understand the concept. And let's say, some of the teachers, whenever you don't understand something that they have taught, they do online research for us to understand. And they also bring pictures for us to understand."*

A student from Nabango Community SHS also added, *"Madam please, for instance, the maths, sometimes, when they give us work, the teacher will come and check all of us whether we have done it or not and if you don't understand, he will teach you. "*

A student from Gambaga Girls also added, *"First when our math teacher is coming to class, he just come to class with handouts and textbooks to do the delivery, but now when he is coming you see him with tablet. Sometimes, laptop, coming to show us some pictures and how practically it is being done"*

Indeed, adapting teaching methodologies is not just about changing the way lessons are delivered, but also about making the content more relatable and understandable for the students. This understanding is reflected in the current implementation of the 'Numeracy Across the Curriculum' PLC handbook in the SETP schools.

This initiative encourages teachers of all subjects, not just mathematics, to embed numeracy in their lessons. The goal is to make mathematical concepts more accessible and relevant to students by integrating them into a wide range of academic contexts. As the SETP school students are taken through how numeracy is applied in different subjects, they can better understand its practical importance and relevance, which can help to improve their proficiency.

Organising Remedial Lessons

To provide additional support to students struggling with mathematics, the SETP mathematics teachers indicated that they would organise remedial lessons. Some of the SETP mathematics teachers indicated that they have already started organising these remedial mathematics lessons while others said they will begin shortly. According to the teachers, during these remedial lessons, they will give the opportunity to the students to identify difficult topics and concept and then, revise these 'difficult concepts. They also indicated that these remedial lessons would serve as an avenue to provide personalised assistance to the low proficient students. A mathematics teacher from Benso SHTS said, *" yeah, I do organise remedial, that is meeting them maybe weekends, assist them especially the weaker ones. One thing that I have to say is that, truly, those that you want to help them especially don't come. That is the truth."*

A mathematics teacher from Zabzugu SHS also indicated, *" Okay. Because of the implementation of PLC, the extra classes that we are doing it, it has so far brought some of the students on board; those who were feeling relaxed, that I don't know anything. Because they been part of the activity, they have been able to change their way of thinking about their performance. So, I think it is the only way that made them pick up the pieces together. we use discussion. During the remedial I use discussion. Because if I want to introduce a lesson, I go through with the discussion method, whether the students ever heard of this particular word or a topic. And you know back at their junior high, most of the topics we teach in the senior high has a bit relation with junior high. So, this helps them to remember some of the things they learnt at junior high. And therefore, they bring up their suggestions and then their ideas about it."*

Another mathematics teacher from Ziavi Community SHS further stated, *" so, with the extra classes, we focus more on the core. And then, when we run the core for some time, then it is being alternate for the elective to have a session in it. But as we are teaching, we cannot be piling all the contents that they have not understood before when it is your turn to run the elective intervention before you start. So, most of the time, you have to find your own time. "*

Students who have attended these remedial lessons reported a better understanding of previously challenging topics. Some quotes from students below

" Madam, maths. At first when a teacher comes to class, he goes straight to the subject but now, when we go to the intervention class, they explain things better."

" It has also helped me. At first, I couldn't sit in class for too long. Whenever I sit in class, I feel bored, and I feel sleepy. But when we go for the intervention class, the way the madam will speak to you, like whenever you are sad, she will ask you what is wrong with you, she wants to know what is wrong so that she will kind of help you. And she also cracks jokes whenever the class is boring."

" As for the maths, the remedial class, they started with counting 1,2,3 and you will write them also. And they will see how you write them and how you will mention it. So, continuously, they started with 1+2 and 3+3.."

" First semester, they were not doing any…I mean Saturday and Sunday classes. So, after the first semester when we come back, some of the teachers will tell us to meet on Saturdays and they will give us a time. Maybe on Sunday. And sometimes after school, we will sit in for 3hours before we close."

1. **Peer Learning**

Peer learning is also being used by mathematics teachers and the school leaders of the SETP schools to encourage learning particularly mathematics learning among students. According to the students, this

innovative approach is facilitating their understanding of complex mathematical concepts, strengthening their problem-solving skills, and fostering a supportive learning community. Below are some quotes from the students.

" After school, sometimes, our class, we organize classes for ourselves, and we teach ourselves. Anyone who didn't understand a question or something, you just ask the question and among us, we will solve the questions on our own. And in the morning, when the teacher comes, we give it to him to know whether we are right or wrong."

" When he explains it and we still don't understand, some of our colleagues understand and so when the teacher goes out, we then go to our colleagues for them to explain it. Maybe they can be using words that you will not understand but if one of our colleagues understands, after the lesson you can go for an explanation in the local language for you to understand better."

" Once they are teaching and you don't understand some part, we have some human beings like our colleagues, if they are fast or if they get the concept the master may call them to explain to us to understand. Sometimes you can just see the teacher and you will feel afraid to ask but if the master calls the student to take you through, that student that understands can explain to you correctly."

Overall, the peer learning being adopted will empower students to take ownership of their education, encourages collaboration, and enhances communication and problem-solving skills. It will foster a positive and supportive learning environment where students learn from each other's strengths and experiences. Through this collaborative approach, the students will not only gain a deeper understanding of mathematics but also develop crucial social and cognitive skills that benefit their overall academic growth.

3.7 Evaluation of 21st century skills assessment

3.7.1 The framework for assessing 21st century skills

Twenty-first century skills as defined by the MoE's secondary education strategy, cover:

- Foundational knowledge, which includes literacy, numeracy, scientific literacy, ICT and digital literacy, financial literacy and entrepreneurship, cultural identity, civic literacy, and global citizenship.
- Competencies include critical thinking and problem-solving, innovation and creativity, collaboration, and communication.
- Character qualities, which include discipline and integrity, self-directed learning, self- confidence, adaptability and resourcefulness, leadership, and responsible citizenship.

The framework for assessing 21st century skills is attached as annex 1. The framework provides a broader explanation of the elements entailed in the three areas under 21st century skills.

3.7.2 Proficiency levels for 21st century skills

Table 3.30 - proficiency levels for 21st century skills

Level of proficiency	Score	Characteristics
Highly proficient	80 - 100%	At this level, students can identify and analyse multiple perspectives. They can reason about ideas and make predictions well beyond the information given in a problem while also effectively evaluating large amounts of information. Students at this level can reason with large amount of information without additional support provided, meaning they can make connections across elements of various problems on their own. These students can effectively explain situations and aspects of situations that require complex thinking such as recognizing unintended consequences, evaluating information to differentiate between biased and unbiased sources and identifying short- and long-term consequences of actions.
Proficient	68 - 79%	Proficient students can identify and analyse as many problems as possible. Students at this level can provide descriptions of situations that are less familiar or require deeper reasoning such as ones that require causal reasoning. These students can also provide explanations of situations and aspects of situations. They demonstrate consistency in their ability to assess, describe and/or explain situations across multiple activities within a problem.

Approaching proficiency	54 - 67%	Approaching proficiency students can identify and analyse moderately complex problems and resolve them. Here, a trade-off is observed between students' ability to reason beyond the explicit information provided in a given problem and the amount of information that must be evaluated. Approaching proficiency students can explain a given situation or aspects of the situation. They demonstrate consistency in being able to assess, describe and/or explain situations across multiple activities within a given problem.
Developing	40 - 53%	Developing students can identify and analyse basic problems and resolve them.
Emerging	39% and below	Emerging students are low achievers in 21st century skills. Few of these students can think critically and solve problems.

3.7.3 How students performed on 21st century skills

Table 3.31 presents a comparative analysis of SETP school students' performance in 21st century skills between 2022 and 2023. There is a significant improvement in the proficiency of these students over this period. In 2023, the proportion of students who achieved 'proficient' or higher surged to 13.7 percent, up from a modest 3.4 percent in 2022.

At this proficiency level, the students can identify and analyse as many problems as possible. Students at this level can provide descriptions of situations that are less familiar or require deeper reasoning such as ones that require causal reasoning.

The improvement in the performance of students in 21st century skills was most evident in Bolgatanga SHS, E.P. Agriculture, and Mangoase SHS (table 3.31).

The positive transition in students' 21st century skills become more evident when observing the lower proficiency levels. Students in the 'developing' category recorded a slight decrease from 37.4 percent in 2022 to 34 percent in 2023, showing a marginal drop of 3.4 percentage points. Similarly, the 'emerging' category recorded a significant reduction of 14.1 percentage points, decreasing from 37.3 percent in 2022 to 23.2 percent in 2023.

This decline in lower proficiency levels should not be interpreted as a deterioration in performance. Quite the contrary, it reflects a progressive shift in student proficiency, as many students previously classified as 'developing' or 'emerging' have transitioned to higher levels of proficiency.

Finally, the data revealed that the most pronounced achievements in 21st century skills were from Gambaga Girls SHS, Mangoase SHS and E.P. Agriculture, Tatale (table 3.31). These schools recorded the highest number of students who transitioned from the emerging proficiency level. In 2022, 6 out of every 10 students from Gambaga Girls SHS and E.P. Agriculture, Tatale were emerging students in 21st century skills. This has reduced significantly by 29.6 percent and 32.9 percent respectively in 2023. Similarly, Mangoase SHS recorded a decline in the proportion of students who were emerging from 32.4 percent in 2022 to 14.6 percent in 2023 – a 17.9 percentage point decrease.

Table 3.31 Percentage of students at different levels of 21st century skills (survey 2023) – by school

	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching Proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023
Benso SHTS	0.0	3.2	1.3	9.7*	42.1	32.3	38.2	41.9	18.4	12.9
Bolgatanga SHS	0.5	4.8*	7.0	26.5*	36.5	39.0	36.5	22.6*	19.6	7.1*
Bosome SHS	0.0	0.8	8.4	13.4	40.0	33.9	33.6	40.2	18.1	11.8
Gambaga Girls SHS	0.0	0.0	0.7	5.2*	4.2	14.6*	28.0	42.7*	67.1	37.5*
Lambussie Community Day SHS	0.0	0.0	0.0	4.2	6.5	25.0*	56.5	41.7	37.0	29.2
Mangoase SHS	0.0	0.6	4.4	7.9	20.6	40.6*	42.7	36.4	32.4	14.6*
Nabango SHTS	0.0	0.0	0.0	2.5	8.0	25.0	48.0	32.5	44.0	40.0
Ogyeedom Community SHTS	0.0	0.0	5.0	8.0	30.0	32.0	45.0	40.0	20.0	20.0
E.P. Agriculture SHS	0.0	2.3	0.0	2.3	5.4	16.3	33.8	51.2*	60.8	27.9*
Walewale Vocational/ Technical Institute	0.0	0.0	0.0	3.5*	7.1	10.3	30.4	34.5	62.5	51.7
Zabzugu SHS	0.0	0.5	0.6	4.8*	11.3	19.1*	42.1	38.1	45.9	37.6
Ziavi Community SHTS	0.0	0.0	2.6	6.8	42.1	27.3	39.5	22.7	15.8	43.2*
Overall	0.1	1.7	3.3	12.0*	21.9	29.2*	37.4	34.0	37.3	23.2*

**p≤0.05*

3.7.4 SETP school students' attainment of the different proficiency levels in 21st century skills

Table 3.31 shows the distribution of students across the five proficiency levels in each of the SETP schools.

Table 3.32 percentage of students at different levels of 21st century skills

Assessments	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching Proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	Survey 2022	Survey 2023	Survey 2022	Survey 2023	Survey 2022	Survey 2023	Survey 2022	Survey 2023	Survey 2022	Survey 2023
Sex										
Male	0.2	2.5*	4.7	15.8*	24.8	30.9*	38.5	32.8	31.9	18.0*
Female	0.0	1.1	2.3	9.2*	19.8	27.8*	36.7	34.8	41.2	27.0*
Level of student										
Form 2	0.0	1.0	2.8	11.2*	21.7	28.7	37.0	35.5	38.6	23.6*
Form 3	0.3	2.2	5.1	12.6*	22.6	29.5	39.1	32.9	33.0	22.9*
School category										
Category A	0.5	4.8*	7.0	26.5*	36.5	39.0	36.5	22.6*	19.6	7.1*
Category B	0.0	1.3*	6.1	12.7*	40.7	33.5*	35.1	40.5*	18.2	12.0*
Category C	0.0	0.4	1.6	5.3*	12.8	23.7*	38.4	37.7	47.3	32.8*
Overall	0.1	1.7	3.3	12.0*	21.9	29.2*	37.4	34.0	37.3	23.2*

*p≤0.05

Highly proficient

On average, across the 12 SETP schools, 1.7 percent of the SETP students attained this level in 2023 compared with only 0.1 percent in 2022. This signifies a 1.6 percentage point increase in the proportion of students exhibiting the highest level of proficiency. These highly proficient students can identify and analyse multiple perspectives. They can reason about ideas and make predictions well beyond the information given in a problem while effectively evaluating large amounts of information. Students at this level can reason with a large amount of information without additional support provided, meaning they can make connections across elements of various problems on their own.

In 2022, Bolgatanga SHS stood out as the only school with students, albeit 0.5 percent, performing at the highest level of proficiency in 21st century skills. Notably, 2023 saw not only a modest increase in the percentage of highly proficient students in Bolgatanga SHS but also the rise of other schools such as Benso SHTS and E.P. Agriculture SHS to this level (table 3.31). These two schools marked their entries with 3.2 percent and 2.3 percent respectively of their students demonstrating the highest level of proficiency.

Proficient

A significant 9 percent more SETP school students are proficient in 21st century skills in 2023 than in 2022. These proficient students can identify and analyse as many problems as possible. Students at this level can provide descriptions of situations that are less familiar or require deeper reasoning, such as ones that require causal reasoning. Proficient students can be said to be top performers in 21st century skills in that they are able to provide explanations of situations and aspects of situations. They demonstrate consistency in their ability to assess, describe and/or explain situations across multiple activities within a problem.
Bolgatanga SHS recorded the highest proportion of top performing students in 2023 (26.5 percent) compared with all the other SETP schools, similar to 2022. The difference between the 2022 and 2023 result for Bolgatanga SHS is 19.5 percent and very significant.

In a discussion with the assistant head academic of Bolgatanga SHS, he highlighted several factors that he believes have contributed significantly to the increase in top performers in 21st century skills at Bolgatanga SHS. According to the assistant head academic of Bolgatanga SHS, a significant initiative was the decision to invest in their ICT capabilities by purchasing computers and refurbishing their ICT lab. This development has increased access to ICT for a greater number of students, enabling them to conduct research and engage with digital resources more effectively.

Moreover, the assistant head academic of Bolgatanga SHS also pointed to the influence of the first PLC handbook titled "Working to the National Teachers' Standards". This resource includes sessions on ICT and 21st century skills, providing valuable guidelines for teachers. During these sessions, all the school's teachers came together to discuss in depth how to integrate 21st century competencies and ICT into their lessons. He further indicated that the teachers were taking through how to make their lessons more practical and encourage the development of key competencies in their students, including critical thinking and communication skills. The assistant head academic further indicated that during his monitoring visits, he noticed that the teachers were implementing these methods, using group work to promote leadership, communication, and collaboration among the students. The assistant head academic of Bolgatanga SHS is confident that these combined efforts have played a crucial role in the increase in top performers in 21st century skills at Bolgatanga SHS, showcasing the power of innovative strategies, ICT, and targeted teaching methods in enhancing student performance.

It is also important to note that there have been significant improvements in the proportions of category B

and C students who are top performers in 21st century skills. Particularly Benso SHTS and E.P. Agriculture SHS (table 3.32). At baseline, none of the students in E.P. Agriculture SHS were top performers in 21st century skills, this has now improved significantly to 2.3 percent in 2023. This situation is similar for Benso SHTS where only a small 1.3 percent was attaining this level of proficiency. The 2023 result has improved to 9.7 percent for this school (table 3.31).

Approaching proficiency

Twenty-nine percent of the SETP students are approaching proficiency in 21st century skills in 2023 compared with 21.9 percent in 2022 (table 3.31). There are notable statistically significant improvements across sex and school category (table 3.32). For instance, significantly more category C SETP school students (23.7 percent) are approaching proficiency in 2023 than in 2022 (12.8 percent). This is particularly true for Mangoase SHS (40.6 percent in 2023 compared with 20.6 percent in 2022), Lambussie Community D (25 percent in 2023, compared with 6.5 percent in 2022) and Nabango SHTS (25 percent in 2023 compared with 8 percent in 2022), (table 3.31).

Students approaching proficiency can identify and analyse moderate problems and resolve them. Here, a trade-off is observed between students' ability to reason beyond the explicit information provided in a given problem and the amount of information that must be evaluated. These students can explain a given situation or aspects of the situation. They demonstrate consistency in being able to assess, describe and/or explain situations across multiple activities within a given problem.

Developing

The proportion of developing students in 21st century skills in the 12 SETP schools was 37.6 percent in 2022. This has however decreased to 34 percent in 2023, signifying a slight reduction of 3.4 percentage points. The reduction in the proportion of "developing" students implies that more students have moved into higher proficiency levels, perhaps approaching proficiency, or even becoming top performers. Table 3.31 provides the school level disaggregated results of the SETP schools whose students have transitioned from developing to higher level proficiency levels.

As seen from table 3.32, the category B school, Benso SHTS, recorded slightly more developing students in 21st century skills in 2023 compared with 2022. The difference however is not significant.

In 2022, Lambussie Community SHS recorded the highest proportion of developing students (56.5 percent) in 21st century skills. However, as observed in table 3.31, the proportion of developing students at Lambussie Community SHS has shown significant improvement, indicating an upward trend in their performance.

Insights from some of the teachers at the school suggest that this noticeable improvement can be attributed to an intentional shift in teaching methods gleaned through PLC sessions. Instead of adhering strictly to traditional instructional techniques, the teachers in the school are adopting an integrative approach where crucial 21st century skills such as collaboration, teamwork, discipline and integrity, and responsible citizenship are embedded throughout the lesson delivery.

According to the teachers, their revised teaching methods have allowed students to better understand, connect, and apply their learning to real-world scenarios. This, in turn, has led to more effective knowledge retention and a deeper understanding of the concepts. The application of such pedagogical strategies is evidently contributing significantly to the students' progression in 21st century skills (details on this can be found in section 3.7.9).

Similarly, across the majority of SETP schools, the trend of adopting innovative teaching strategies is evident. Teachers are continuously striving to move away from the traditional rote learning approach to more experiential and student-centric methodologies. This shift is fostering a conducive learning environment where students can explore, question, and learn in a way that encourages understanding and application over mere memorization. As the SETP schools continue to create a learning environment that promotes academic growth alongside personal and social development, they are effectively preparing their students for the challenges of the 21st century.

Emerging

There has been significant decline in the proportion of students categorised as "emerging" in 21st century skills in the SETP schools (table 3.31). In 2022, 37.3 percent of the students fell into this category, a figure which dropped significantly to 23.2 percent in 2023. This represents a decline of 14.1 percentage points, a significant progression in a little over one year (table 3.31).

Significant reductions were particularly observed in Gambaga Girls SHS, Mangoase SHS and E.P. Agriculture, Tatale, which recorded the highest proportions of "emerging" students in 2022 - 67 percent, 32.4 percent and 61 percent As detailed in table 3.31, the figures for these schools saw a substantial drop in 2023, falling to 37.5 percent for Gambaga Girls SHS, 14.6 percent in Mangoase SHS and 27.9 percent in E.P. Agriculture, Tatale.

This shift signifies that a larger proportion of students are transitioning from the initial stages of 21st century skills proficiency toward advanced levels. The marked improvement in these key skills indicates a positive trajectory in students' ability to not only comprehend but also practically apply these skills in varied real-world scenarios.

This improvement in the SETP school students' performance is an encouraging indicator of the progress being made towards developing the 'complete' learner, one equipped with a thorough understanding of core subject knowledge and the necessary skills to apply it. This further reinforces the importance of 21st century skills, which are crucial for their future academic and professional endeavours.

Progress in SETP students' 21st century skills: A comparison between intervention participants and baseline performances

The data presented in table 3.33 provides a comparative analysis of the 21st century skills performance of third-year SETP students in 2023 against their baseline results from 2022, before the intervention.

Table 3.33 21st century skills performance comparison: Third-year SETP Students (2023) versus their baseline in 2022 (Pre-Intervention) - percent

	Second-year students baseline result (2022)	Current third-year students' endline result (2023)	Difference (2023-2022)
Highly proficient	0.0	2.2	+2.2
Proficient	2.8	12.6	+9.8
Approaching proficiency	21.7	29.5	+7.8
Developing	37.0	32.9	-4.1
Emerging	38.6	22.9	-15.7
N	**969**	**730**	

As seen in table 3.33, the improvement in the proportion of students in the 'proficient' level increased from 2.8 percent to 12.6 percent. Interestingly, the proportion of students 'approaching proficiency' in 21st century skills in the SETP schools also saw an increase of 7.8 percent.

Concurrently, the 'developing' category experienced a slight decrease of 4.1 percent. However, this dip is not a setback. Rather, it signifies that students are transitioning from the developing phase into higher proficiency levels, which points to the effectiveness of the teaching strategies in place.

Finally, a significant decrease was observed in the 'emerging' proficiency level, from 38.6 percent in 2022 to 22.9 percent in 2023. This suggests that more students are progressing beyond the early stages of learning 21st century skills.

Table 3.34 21st century skills performance comparison: Intervention participants in third-year (2023) versus non-participant third-year students assessed in 2022 - percent

	Third-year students (SETP intervention participants) results	Third-year students (i.e. non-SETP intervention participants who completed in 2022) baseline result	Difference
Highly Proficient	2.2	0.3	+1.9
Proficient	12.6	5.1	+7.5
Approaching Proficiency	29.5	22.6	+6.9
Developing	32.9	39.1	-6.2
Emerging	22.9	33.0	-10.1
N	730	297	

Table 3.34 provides a comparative analysis of the 21st century skills of third-year SETP students who participated in the intervention in 2023 against non-participant assessed in 2022. As can be seen in the table, there are considerable differences in 21st century skills between the two groups of third-year students. On the one hand, higher percentages of the SETP students were in the two highest categories of 21st century skills proficiency. On the other hand, compared with the non-SETP students a smaller percentage of the SETP students were in the two lowest categories of proficiency.

Table 3.35 21st century skills performance: Intervention participants now in second-year (first year at 2022 baseline) vs. 2022 baseline results of second-year students - percent

	Results for current second-year Students (SETP Intervention Participants)	Baseline results for second-year students assessed in 2022	Difference
Highly Proficient	1.0	0.0	+1.0
Proficient	11.2	2.8	+8.4
Approaching Proficiency	28.7	21.7	+7.0
Developing	35.5	37.0	-1.5
Emerging	23.6	38.6	-15.0
N			

An analysis of the 21st century skills of second-year SETP students in 2023 and second-year students assessed in 2022 is presented in table 3.35. There are considerable differences in 21st century skills between the two groups. On the one hand, higher percentages of the current second-year students were in the two highest categories of 21st century skills proficiency. On the other hand, compared with the second-year students assessed at baseline in 2022, smaller percentage of the current second-year students were in the two lowest categories of proficiency.

3.7.5 SETP students' performance in the different aspects of 21st century skills

Each item in the 21st century skills assessment was classified under three broad areas: foundational knowledge, core competencies, and character qualities. Table 3.36 provides an analysis of the domain for 21st century skills for 2022 and 2023.

As seen in table 3.36, there has been some improvement in the different aspects of 21st century skills over the time period. While the result in table 3.36, shows this slight improvement across most of the domains, it is essential to delve deeper into the areas that still require attention and further development.

Table 3.36 Students' performance in different aspects of 21st century skills (mean percent)

	Survey 2022	Survey 2023
Discipline and Integrity	65.9	67.3
Responsible citizenship	49.1	49.7
Cultural identity, civic literacy, and global citizenship	47.4	49.8
ICT and digital literacy	51.5	53.3
Self-discipline	44.0	48.1
Adaptability and resourcefulness	48.4	48.8
Leadership	46.5	48.6
Financial literacy and entrepreneurship	36.5	39.0
Critical thinking and problem-solving	27.3	28.6

The domain 'critical thinking and problem solving' stands out as an area where students demonstrated the lowest scores in both years. Although there was a slight increase from 27.3 percent to 28.6 percent, it is crucial to recognise that critical thinking and problem-solving skills are fundamental for students' success in the rapidly evolving world. These skills enable students to analyse complex situations, think creatively, and develop effective solutions. Therefore, it is imperative to ensure that the SETP schools are emphasising and using teaching methods that foster critical thinking and problem-solving abilities among students. This includes encouraging inquiry-based learning, providing opportunities for collaborative problem-solving, and integrating real-world scenarios into lessons.

It is also important to recognise that 21st century skills are interconnected and mutually reinforcing. Students' ability to think critically and solve problems effectively often relies on their proficiency in other areas, such as ICT and digital literacy, self-discipline, and adaptability. Therefore, a comprehensive approach to skill development should consider the integration of these skills across different subjects and activities, allowing students to apply and reinforce their learning in various contexts.

3.7.6 Modelling student performance in 21st century skills – multiple regression analysis

In order to understand the factors influencing SETP student performance in 21st century, a multiple regression analysis was conducted. The analysis considered several variables, including sex, age of the student, the grade level, remedial class attendance and having a computer or a laptop at home (see table 3.37).

Table 3.37 Output of multiple linear regression of 21st century skills

Characteristics	Coefficient (Sig*)	95% confidence interval
Age of student	0.04	-0.095, 0.176
Sex of student	-3.719*	-5.639, -1.798
Grade	0.896	-1.049, 2.842
Remedial class attendance	2.12*	0.118, 4.122
Have a computer/laptop at home	-0.794	-1.925, 0.338

The age of the students did not have a significant effect on their 21st century skills scores.

Female students obtained about 3.7 percent lower scores compared with male students.

The analysis indicated that students who attended these classes performed better in reading compared with those who did not.

3.7.7 Qualitative findings on 21st century skills

3.7.7.1 Factors contributing to improved proficiency scores in 21st century skills among SETP school students

1. **Improved approach to teaching as a result of the PLC session.**

The SETP teachers and school heads emphasised the significant impact of the PLC session on teachers' lesson delivery. They indicated that the sessions provided teachers with opportunities to share best practices, co-design lessons, and refine instructional strategies. Through PLCs, the SETP teachers were able to create engaging and interactive lessons that encouraged student collaboration and active participation. The teachers further indicated that they use group work activities to enable their students to develop essential teamwork and communication skills, learn from their peers, and gain confidence in expressing their ideas. According to the teachers and school heads, this is fostering the development of 21st century skills such as communication, collaboration, adaptability and resourceful. For example, some SETP teachers mentioned that:

" Okay so right now, since we have been learning and we impact some of the things we learn there. They (students) are also getting to realize some of the important things they can get an example is some special skills that they have. Example, leadership skills, collaborative skills and the rest; there are some people who are good leaders in the class and through PLC. It has given me the teacher the knowledge to bring out those skills in them and it is also helping them."

" In terms of students' motivation, we have learnt a lot. Sometimes, in the course of lesson delivery, if students find it difficult to understand your lesson, it could be that they have hidden problems. So, through the program we have been attending, we have got to know that we have students with different attention focus. And so, we learn techniques and strategies, different types to be able to handle those students. Now, I can assure you that we are good at using those methods and strategies."

" For me, I can say my teaching approach has changed in the sense that, at first maybe you were teaching with…sometimes the teacher will be in the class and after class, giving exercises to students to do. And that one too, some students copy. So, nowadays, we group them, and we give the exercise for them to discuss it in their groups and later they come and explain to the whole class for them to listen. This means that they are able to work together as a team, collaborate and present."

"Like I said, this PLC is here to build the teachers, in-service training and I am here and I am part of the teaching personnel. So, I will say that it has improved upon my teaching because when we meet, we have the experience of sharing ideas and the inexperienced ones, the in-service person's, we learn from them. How you divide your lessons, how you use objects, how you incorporate ICT and these types of things. How you build on your...the students, you pay attention to the literacy aspects. Learning from other colleagues has really helped us."

" Ooh this one that I wasn't doing before PLC came into being like GESI that I was not integrating into my lessons, 21st century skills, the use of the digital platforms. With the help of PLC, I have gotten to know. And at times, I have also gotten to know what is also going on in other departments because we do share Whatever is going on in other departments. I have gotten to know a lot."

Triangulated responses from students echoed the positive effects of the PLC sessions. The students expressed appreciation for the opportunity to work in groups, highlighting how it allowed them to exchange ideas, learn from different perspectives, and develop their leadership qualities. Students emphasized that the presentation of group activities not only enhanced their communication and presentation skills but also promoted their ability to adopt and work in teams.

"There are a lot of changes going on especially in teaching, comparing last year's teaching and this year's teaching. Now, the teachers use the 21st century skills such as technology to teach us in the classroom.

Some of the teachers bring music box to the class, they download some audios and some show videos of things that we want to know. At first, when you answer a question in class and it is wrong, the teacher will discourage you but now, there is an improvement. If you answer a question and you are wrong, the teacher will tell you that you have tried, and he will correct you to do the right thing. They have put us into groups, and we are given group work, assignments, interventions and a lot of things."

" From March 2022 to his time, what has happened is that, when the teachers are teaching, they make sure that all the students get the concept before they continue and when they are leaving, they make sure to give an assignment before they leave. They also group us and give us group presentation. This is to build our confidence level so now; every student can speak. Previously, I couldn't speak in front of many people but since they started with the presentation in front of the students, it has built my confidence and now most students are not shy of the crowd anymore. "

" In addition to what my sister said, some of us can't stand in front of our colleagues and teach them some topics, but now we can. In cases where a student may not be able to understand what the teacher teaches, we teach ourselves. We lead them. And now the introduction of the 'pick as you go' too has helped us keep our compound clean; you cannot find any rubber around. At first, we were surrounded by rubbish but now it is clean because when you see a rubbish around, then you pick it."

Integration of ICT in Lessons

According to the SETP school teachers, ICT tools and resources played a crucial role in enhancing student engagement and proficiency in 21st century skills. Which is why they are embracing the use of laptops, educational apps, and online platforms to supplement their lessons. The teachers further indicated that their incorporation of ICT is creating dynamic and interactive learning experiences that resonate with the digital-native generation of students. These tools provided students with opportunities to explore, analyse, and apply 21st century skills in real-world contexts.

" Okay, initially I wasn't using any form of technology in my teaching but through PLC sessions I have come to realize and learnt that using some form of technology in my teaching would actually improve me and also my students."

" When we were dealing with geometry for example, we were looking at shapes and so we had to go to the ICT lab so that we can now project a different kind of shape. We were projecting the polygons, so you project and identify the various kinds of polygons. That's where some of them realized that even though the football is of a circular shape, it is made up of several shapes to form, things that you can't see, or you can't measure it. "

"There are a lot of changes. Because a lot of us acquire different skills from the PLC session when we start implementing them. Mostly, we teach with ICT tools and then, we also make sure that when we are teaching, we do what we call, gender groupings, which will enhance your teaching. "

"Yeah. Like digestive system, if you look at the digestive system, in actual fact, you will have to sketch the diagram on the board, label the parts, ask your students to name the parts or write the parts on the board or as you pronounce it, they should follow. Then after which you can ask them to write down or sketch the diagram in their notebooks and label the parts. Then maybe, if you have projector, that would have been a simple way. Then you will project it on the board for them to see and then you can ask them to name the parts or sketch and label the parts. As they do that, they are improving their reading skills, writing skills and then you are also including the ICT tools in the learning, which means that they now know they can see

these things online. When they go home, we tell them to use their parents' phone to do research like we are doing. "

Triangulated student responses affirmed the positive impact of ICT integration. They reported increased engagement, motivation, and enjoyment in lessons that incorporated digital tools. Students highlighted how ICT facilitated access to a wide range of resources, enabled personalised learning experiences, and developed their digital literacy skills. Furthermore, the use of ICT promoted critical thinking, problem-solving, and digital communication skills, which are vital in the 21st century landscape.

" With what I like most, when we first came to form one, there was no science laboratory but now we science laboratory, and ICT laboratory. So, we go there for research and other things whenever we need more information."
" When they are in the classroom, when they are teaching, they use things that are relevant to us so that we can understand. In presentations like this, they say ICT and so they use PowerPoint to display things for us. With geography like this, they use the laptop, and they project rocks and where they are located."

Improved teacher discipline and Implementation of Interventions focused on student discipline

The SETP school heads have shared valuable qualitative insights regarding how they are embedding 'discipline' which is a key domain of 21st century skills in their students. According to the school heads, they have adopted a dual approach, focusing on both teachers and students. The school heads believe in the power of example, and they have put in place interventions to enhance discipline among students.

For teachers, the SETP headteachers indicated that have put in place systems that will enable teachers to attend school regularly and be in class on time. They stated that there are attendance books in each class for students to record teacher attendance. This attendance books are logged with the assistant head academic who regularly meets with teachers who are late or miss lessons.

Secondly, the SETP headteachers indicated that they have established a guidance and counselling unit, appointed staff members as guidance and counselling coordinators, and implemented programmes to improve students and staff behaviour. According to the headteacher of Mangoase SHS, *"the school has a full-time guidance and counselling coordinator with a guidance and counselling team in place. we have also selected and trained students as peer counsellors who identify and assist their colleagues who need support and refer cases to the guidance and counselling coordinator as well. We are organising guidance and counselling programs on academic, social life, emotional, career development, etc. for students. We are offering group counselling to students. These services are helping students understand their course and also career opportunities available for them."*

The school heads have also noted that their measures have led to teachers paying more attention to individual students' learning needs and adhering to the GES code of conduct and school rules. This has created a positive learning environment, as confirmed by a teacher in Bolgatanga: *"Our headteacher and the G&C unit organised a series of training for us to help us to be more effective in the classroom. We understand the importance of discipline in creating a positive learning environment, and we are committed to ensuring that our students succeed."*

Across most of these SETP schools, management has included guidance and counselling activities in the academic calendar and positive disciplinary tools are being used instead of corporal punishment. The assistant headteacher of Bosome SHTS indicated that *"We fully recognize that maintaining discipline is crucial for our school's success. However, we also understand the importance of empathy and support in*

nurturing our students. That's why we are committed to creating a positive learning environment that not only fosters academic growth but also cultivates personal development. By shifting our approach to discipline, we have seen a remarkable change in our students' attitudes and their eagerness to learn."

Overall, the SETP school heads believe that these systems are contributing to improved student performance in the 'discipline' domain of 21st century skills. They are committed to maintaining these systems to ensure the continued success of their students.

3.7.7.2 Why some SETP school students are still underperforming in 21st century skills

Findings from section 3.7.5 revealed that 'critical thinking and problem solving' is the domain where students demonstrated the lowest scores in both years. Not surprisingly, the findings in the teacher section i.e. (3.8.5.1) revealed low scores for teacher integration of critical thinking and problem-solving skills in lessons. Insights and observations (particularly) during lessons in the SETP schools revealed the following:

1. **Integration of critical thinking and problem-solving in lessons is still a problem**

The teachers who were observed have acknowledged that the integration of critical thinking and problem-solving skills into lessons remains a challenge. Despite their efforts to promote these skills, some teachers struggle to design and implement activities that effectively fostered critical thinking and problem-solving abilities. This is reflected in the low scores recorded by teachers in assessing students' performance in these areas.

This situation underscores a clear need for additional support and professional development opportunities for teachers. Such opportunities could enhance their understanding and ability to effectively implement critical thinking and problem-solving methodologies in their lessons.

One potential strategy could be to provide teachers with specific frameworks that outline how to incorporate critical thinking and problem-solving exercises into their lesson plans. These frameworks could offer step-by-step guides, examples of effective exercises, and tips on how to encourage students to think critically and solve problems independently.

Another strategy could involve instructional strategies that promote critical thinking. For instance, teachers could be trained on how to use ‘Socratic questioning’, a technique that encourages students to think deeply about their assumptions and the implications of their ideas. Teachers could also be trained on how to design project-based learning activities, which require students to apply their critical thinking and problem-solving skills to complete complex, real-world tasks.

2. **Limited access to ICT labs with working computers and internet**

Insights from students highlighted the issue of limited access to well-equipped ICT labs with working computers and reliable internet connectivity. Most SETP schools lack the necessary infrastructure to support the effective integration of ICT into lessons. Students expressed frustration over the limited availability of digital resources and opportunities to develop their ICT skills. For instance, a student from Benso SHTS said: *"Please, I want to add that with the ICT laboratory we have it, but we don’t have what we need, like the computers and laptops that we expect to go to the lab to see. Because we suffered when we were in form one and two and those coming too are suffering. So, we need that too. "*

Another student from Mangoase reiterated the point below: *" the aspect I like the most is the ICT laboratory. Like sometimes when we went there, we used only one laptop, we don't have computers. That is the only thing that I want it to be improved. We want computers."*

A student from Ziavi Community SHS further stated that: *"I think they have to supply some materials that our school needs, for example our computers. We do ICT but our computers are not working. We don't practice; we just read and learn so we have to put that also in place so that we become perfect in it. "*

Interviews with school leaders revealed that addressing this issue requires investments in infrastructure and resources, as well as comprehensive training for teachers to effectively utilise ICT tools in their lessons. To overcome this barrier, schools could consider alternative approaches such as mobile device initiatives (which some teachers are already using) and leveraging existing community resources to ensure students have equitable access to technology for enhanced 21st-century skill development.

3. **No integration of domains such as financial literacy and entrepreneurship**

The teams who observed lessons in the SETP schools did not see teachers integrating 21st century skills domains such as financial literacy and entrepreneurship in their lessons. Subsequently, the student assessment revealed low mean scores obtained by the students in this area.

Interviews with the teachers revealed that this gap is due to a lack of guidance for teachers on how to effectively incorporate these domains into their teaching. This has resulted in students (except those studying business as a programme) not being sufficiently exposed to essential financial literacy skills, such as budgeting, financial planning, and understanding economic concepts.

Similarly, the integration of entrepreneurship education has been limited. This has deprived students of opportunities to develop skills in creativity, innovation, and business acumen, which are crucial for entrepreneurial success. Students have expressed a desire for more practical experiences and real-world applications of financial literacy and entrepreneurship. This feedback underscores the need for a more comprehensive approach to teaching these domains.

To address this gap, there are several potential strategies that could be implemented. One such strategy could involve the development of a PLC handbook on financial literacy and entrepreneurship. This will then allow teachers to thoroughly discuss how these areas can be integrated into their lessons, trial them in class, and provide feedback during PLC sessions.

Another strategy could involve the SETP schools collaborating with external organisations, such as financial institutions and businesses. These organisations could provide valuable expertise and resources to support the integration of financial literacy and entrepreneurship. For example, a teacher could invite a financial institution representative to co-teach his class, this financial institution representative could then provide practical examples of the work his institution is performing and how this is being done. Entrepreneurs could also be invited to give a talk to students.

In essence, while the current situation presents a challenge, it also offers an opportunity for SETP schools to enhance their teaching practices. Through leveraging resources and collaborations, they can effectively integrate financial literacy and entrepreneurship into their lessons, thereby equipping their students with essential 21st century skills.

3.8 Teacher-related results

3.8.1 Teachers who are motivated and want to remain in the profession

Teachers' dedication and competence are two important factors that influence students' learning outcomes[9]. Teachers who are committed to the teaching profession have a higher likelihood of going beyond the skills they have acquired to be innovative and resourceful in using innovative means of imparting knowledge to their students. Another key factor that drives teachers' willingness to commit to their work is motivation. Such motivation refers to the psychological process that influences individual behaviour with respect to the attainment of workplace goals and tasks. Motivation has also been viewed as energy or drive that moves an individual to do a task naturally[10].

The SETP surveys measured teachers' motivation and their desire to remain in the teaching profession till they reach their retirement age. The survey asked SETP teachers to self-rate whether they agree or disagree (five-point Likert scale) with questions relating to their motivation. These question items were adopted from a World Bank[11] study on teacher motivation and retention[12]. The score for this indicator was computed by dividing the average score obtained by 5 (i.e., the average maximum score for the indicator). For instance, if the average score obtained is 3.8, the score would be computed as (3.8/5 *100) = 76.0 percent. The results are presented in table 3.38.

On teacher motivation, the results show no significant difference between 2022 and 2023 surveys. As seen in the table, 12.4 percent of the teachers were motivated to teach in 2023 compared with 11.5 percent in 2022. The results further recorded no significant difference in 2023 on teachers' willingness to remain in the teaching profession. However, significantly more older teachers (52.8 percent) are willing to remain in the teaching profession compared with younger teachers (45.3 percent). Also, teachers with many more years of experience (55.8 percent) are willing to remain compared with teachers with less experience (39.5 percent). Table A2.13 in annex 2 shows the proportion of teachers who are motivated and want to remain in the teaching profession by school. As shown in the results, teachers in Walewale Vocational/Technical Institute are more motivated and willing to remain in the teaching profession compared with other schools. The school with the least proportion of motivated teachers was Ziavi Community SHTS.

[9] *Bennell, Paul and Kwame Akyeampong. "Teacher Motivation in Sub-Saharan Africa and South Asia." (2007).*
[10] Jiying Han & Hongbiao Yin | Mark Boylan (Reviewing Editor) (2016) Teacher motivation: Definition, research development and implications for teachers, Cogent Education, 3:1, DOI: 10.1080/2331186X.2016.1217819 [11] World Bank (2017). Teacher skills and motivation both matter (though many education systems act like they don't). https://doi.org/10.1596/978-1-4648-1096-1_ch6
[11] World Bank (2017). Teacher skills and motivation both matter (though many education systems act like they don't). https://doi.org/10.1596/978-1-4648-1096-1_ch6

Table 3.38 Teachers who are motivated and want to remain in the profession by year (%)

Category	Motivated teachers		Teachers who want to remain in the profession	
	2022	2023	2022	2023
Sex				
Male	12.2	10.6	47.7	48.8
Female	9.9	16.7	54.9	52.1
School category				
Category A	9.1	5.3	50.0	52.6
Category B	17.1	14.3	46.3	57.1
Category C	10.6	12.7	50.6	47.8
Years of teaching				
Less than 5 years	12.0	6.8	54.4	39.5
5 to 10 years	10.7	11.5	53.3	46.2
More than 10 years	11.8	15.0	40.8	55.8
Age category				
Youth (35 and below)	13.1	11.2	56.9	45.3
Non-youth (36+ years)	10.8	13.6	53.8	52.8
Overall	11.5	12.4	49.8	49.4

*P ≤ 0.05

Table 3.39 presents the proportion of teachers who agree or strongly agree with statements about teacher motivation.

Table 3.39 presents the proportion of teachers who agree or strongly agree with statements about teacher motivation. The results show that nearly 9 of 10 teachers agreed that their salaries are not sufficient for their needs. This result is similar to the baseline survey. Less than a fifth of the teachers indicated that they do not get paid on time, which is also similar to the baseline results.

Table 3.39 teachers who strongly agree/agree to questions on motivation (%)

Items assessed for teacher motivation		
	2022	2023
As a teacher, I am contributing positively to the lives of my students.	97.9	97.5
I feel confident about my abilities as a teacher.	95.5	94.6
I can get students to work in groups or pairs.	92.6	96.3
If a student does not remember information in a previous lesson, I would know how to help them remember.	95.5	97.1
Every teacher can continue to improve their practice throughout their career.	95.9	95.5
I can make my classroom a safe space for students, both emotionally and physically	93.0	92.2
I can motivate students who show low interest in school.	91.0	90.5
If a student in my class is undisciplined, I know some techniques to direct him or her.	88.1	94.2
With the help of my colleagues, we can solve student issues.	90.1	90.9
My pay as a teacher is insufficient to support my needs	89.7	87.6
With the help of my colleagues, we can identify innovative practices.	91.4	89.3
When a student gets a better grade than he or she usually gets, it is because I found a better way.	84.4	87.2
I can get through to even the most difficult or unmotivated students.	80.3	87.6

My headteacher treats me with respect.	80.7	81.0
I feel exhausted at the end of the school day	79.0	80.2
I feel energized when my class greets me each day	76.5	75.6
My colleagues at school make it a fun place to be.	75.7	70.7
I can help students overcome some difficulties at home and in the community	70.0	69.4
I ask my colleagues for feedback.	72.0	85.5
I ask my supervisor for feedback.	70.4	84.7
I would accept that offer if I were offered another job outside the teaching profession at about the same or a slightly higher salary. ***	68.3	62.4
I have the ability to get parents involved in their children's education.	63.8	68.2
My headteacher praises me for my efforts in the school.	58.0	71.1
Some teachers at my school want to transfer to schools***	63.8	66.1
Parents value my work as a teacher***	50.6	51.7
Teaching is mentally draining. ***	46.5	50.8
I feel fatigued when I get up in the morning and have to face another day at school***	42.0	49.2
I plan lessons with a colleague	51.0	59.9
I can influence some of the decisions that are made in the school.	56.0	50.0
As a teacher, I am given more responsibilities than I can manage. ***	35.4	40.1
If I had to choose again, I would still want to be a teacher.	49.8	45.5
Teachers in my schoolwork closely with the district SISOs (formerly circuit supervisors)	25.1	27.7
I do not get paid on time.	30.5	22.7

NOTE: *** Respondents who agreed or strongly agreed with a negative statement. In the computation of the rubric, the highest score was allotted to those who disagree strongly and the least score to teachers who agree strongly.

As part of the analysis, the study conducted an exploratory factor analysis using principal component analysis to determine the variables relevant to measuring teacher motivation based on the Likert scale used for the assessment. Thirty-four questions, using a five-point Likert scale (5= strongly agree, 4= agree, 3= neither, 2= disagree, 1= strongly disagree), were used in the model. The result of the factor analysis generated a Kaiser-Mayer-Olkin (KMO) value of 0.82265. This value indicates that the test is adequate for factoring. The result in table A2.14 in annex 2 shows that nine factors are adequate in explaining the motivation of teachers in the schools. The varimax transformation matrix lists the factors in the order of importance. As seen from the table, the factor by their level of importance is listed below:

- If I had to choose again, I would still want to be a teacher.
- I feel fatigued when I get up in the morning and have to face another day at school
- As a teacher, I am contributing positively to the lives of my students.
- I can motivate students who show low interest in school.
- My headteacher treats me with respect.
- I can influence some of the decisions that are made in the school.
- With the help of my colleagues, we can identify innovative practices.
- If I had to choose again, I would still want to be a teacher.
- Some teachers at my school want to transfer to other schools.
- If a student does not remember information in a previous lesson, I would know how to help them remember.

3.8.1.1 Qualitative insights on teacher motivation and willingness to remain in the teaching profession

The survey sought to obtain qualitative insights from teachers on their motivation and willingness to remain in the teaching profession. During in-depth interviews with SETP teachers, the teachers revealed that they feel motivated when they see improvement in their students' performance. One teacher indicated that he is motivated enough to give his best when performing his duties because his motivation is derived from intrinsic factors rather than extrinsic. According to the teacher, seeing improvement in students' performance makes him feel satisfied. An instance was cited by the teacher, and he explained that when he was first posted to the school, many students could not speak English which affected how he interacted with them. However, if he compares the previous situation to now, he feels motivated because the students have improved significantly in English. Despite the teacher's motivation, he does not want to remain a teacher in future. He indicated that he wishes to explore other job offers in the education sector such as working in the district or regional GES office. Another teacher suggested that being motivated as a teacher is an ongoing state of mind and thus, certain conditions can alter it. The teacher explained that he is especially motivated intrinsically when his students are able to understand what was taught as well as through extrinsic means when he gets incentives for a good job done. According to the teacher, a motivated teacher works extra hard and gives much attention to his duties and tasks. On his willingness to remain in the teaching profession, he responded positively by stating that *"teaching is more or less like the work of God, which bringing children up and raising them to become useful to the society. I like the teaching work because you get time to spend with the new generation...".* Another teacher revealed that participating in programmes in educational transformation such as the SETP has motivated him as a teacher. He explained that being introduced to innovative ways to use and apply TLRs through the SETP has helped make him and other teachers feel satisfied because it helps students to understand lessons more effectively.

Some teachers, however, revealed that they are not motivated and are unwilling to remain in the profession. According to one teacher, even though improvement in students' performance can bring him satisfaction, he feels demotivated due to poor salaries, lack of incentives and poor performance of students. The teacher emphasised his unwillingness to remain in the teaching profession by listing a number of factors. Some of the demotivating factors include poor teacher salaries and incentives, lack of appreciation for teachers as well as the school management's inappropriate ways of addressing teachers' concerns and school board's ability to resolve the issue of admitting students with poor BECE aggregates. A teacher stated that he is not motivated as a teacher because he believes people who have lower educational qualifications than him are enjoying more monetary benefits.

Another teacher confirmed the issue of poor teacher salaries as a demotivating factor by explaining that teachers are required to pay monthly taxes thrice the amount of their SSNIT. Another teacher who claims to be unwilling to remain in the teaching profession rhetorically asked that *"…If your student have nothing to offer to society in future and they mention you as the one who taught them at the SHS level, will you be happy?* Below are some more qualitative quotations from teachers during in-depth interviews:

- *"To me motivation is when you know students are learning. For instance, when students come to me with a lot of questions, and visiting unfamiliar subject areas means they are reading. Just recently when I went to class, I wrote something on the board, and I asked them to identify the words that they are familiar with. To my surprise, they were able to identify more than necessary which means they are reading".*
- *"Ooh yes, I feel motivated because when I came to this school, it was difficult to interact with students because they struggled with the English language. But now, we are able to have interactions and that alone motivates me because it means I am doing a good job".*
- *"I started teaching even before I became a professional teacher. I feel it is my purpose to be a teacher. I am willing to remain as a teacher and I will be happy to retire in the teaching profession.*

- *"If I get a new job, I will go… Even though I like the teaching profession, I want to go higher in the education sector. So, I want to improve my qualification level and rise higher to work in the district or regional GES offices".*
- *"Even though I get motivated when my students do well, I am unwilling to remain a teacher because of poor working conditions as a teacher".*
- *"One thing that is driving me on in my teaching profession is [improving] students' performance. That is what I am always seeking because whenever my students perform well, it means I have achieved something… which is not monetary matters. That is why I prefer making sacrifices and doing things to help students succeed at the end of the day. So, to me, I am motivated because I am not looking at the financial gains."*
- *"I look at motivation in two folds. Motivation can be in kind, or it can be in cash. Commending someone for a good job done through word of mouth alone is motivation for me. Sometimes, they just come and speak anyhow to you in class; even when you have a just reason why you may not be able to come to school and you call, they will speak to you inappropriately. So, honestly, I am not motivated because I hardly hear words of commendation and encouragement from management staff".*
- *"I'm I motivated? I will say yes and no. Firstly, I am motivated through the SETP programme because I am able to apply what I have learnt. However, what demotivates me is the kind of students we have in this school. [My frustration] is you'll use various teaching methods to teach, and you'll observe that the students are happy because they seem to understand. But come the next day, when you do a recap, it is as if you have taught nothing. In fact. I told my colleague that I am unhappy in this school."*
- *"I am saying no. Like I told you, if you are teaching and your salary is not much, and the students are performing there is joy in teaching… But looking at the kind of students I teach, I wonder whether in about 4 to 5 years' time, I will meet them occupying very good positions. So that is making me not to want to remain in the teaching field".*
- *"If you are able to teach your students and at least majority of the class is well abreast with the topic, it helps you the teacher. If your students are performing, it helps you to know that whatever that you are impacting, is helping them. That is a kind of motivation to me".*

How SETP is motivating teachers

The qualitative survey sought to obtain insight into how SETP is motivating teachers in the 12 schools. Some teachers revealed that the SETP has motivated them through the knowledge gained from the PLC sessions they attended. One teacher indicated that the SETP programme has help him to improvise in the use of TLRs. He explained that as a science teacher, the programme has helped him to improvise in the use of TLRs for teaching the periodic table, respiratory system, and the digestive system. The teacher continued and indicated that *"the knowledge gained from SETP is motivating because it has already yielded positive results after applying it during lesson delivery".* Another teacher revealed that being part of SETP's training sessions has motivated her to always perform at a high standard in order to set her apart from her other colleagues who are not part of the programme.

- *"The SETP programme has really motivated us a lot. I remember a recent training that we went, it was in Accra by T-TEL… they taught us a lot. One thing that I really enjoyed was how to improvise materials/TLM's for teaching. They taught us how to improvise materials. I remember in chemistry; they taught us how to improvise with the use of the periodic table. So, when I came, I remember that...during the students' workshop that they recently attended, I guided them, and they did it themselves. When they sent it to the head, the feedback or responses were very good. So, when I*

saw that, I was really motivated. It is even there right now. They also taught us how to improvise the respiratory system and the digestive system".

- *"The SETP programme has helped us in what we do. Now, we can teach in a more practical way".*
- *"The SETP programme has helped me, and I feel happy because it will make learning easier… having the learning centre makes learning easier and I also feel happy that my students will understand lessons better. But, as for motivation, it is non-existent. For me, when it comes to motivation the bottom line is cash. If there is no cash entering my pocket, there is no motivation".*
- *"Yes, SETP has motivated me a lot, because… we were having issues with supervision and other stuffs but now because of SETP, the supervision, though it is not 100 percent, has improved. Helping people to do the right thing at the right time and that alone is enough motivation to me, because as teachers, our end product is how successful students will be at the end of the day, so, if you have measures put in place to help students to achieve their goal in the school, then it's enough".*
- *"Okay, I will say that the SETP programme activities are motivating me. First of all, if the students in the school are discipline, I wouldn't have any problem as a teacher. I wouldn't have to shout and stress myself on disciplinary or behavioural issues. So, it is a form of motivation for me and then if they are able to understand and are able to produce results when I teach in class through the methodologies that I have learnt from SETP".*
- *"There is so much pressure on me, not that anybody is pressurizing me, but I feel my colleagues see me as a beneficiary of the T-TEL program so I should know certain things. So, it's like the standard is so high for you. So, yes, the fact that I have been a beneficiary of the SETP program motivates me to do well among my colleagues. So that, even when observers come, they know that ooh, well, she has been there, she has done that. So, yes, SETP motivates me".*

Ways to motivate teachers from the perspective of teachers

With regards to recommendations from teachers on ways to motivate them, insight from in-depth interview with teachers revealed that the working conditions for teachers should see significant improvement. For instance, one teacher suggested that teachers should be offered some tax relief or exemption as a form of incentive to motivate them and boost their willingness to remain in the profession. Another teacher indicated that for teachers to remain in the profession, conditions such as provision of health insurance and housing allowance as well as being granted the go ahead to organize private lessons for students to generate extra income. Below are some verbatims from teachers on what should be done to motivate them to remain as teachers:

- *"There should be some allowances for us as teachers. There are some professions, like nursing for instance, when their children go to the hospital, they don't pay. But as a teacher, when my children go to school, I pay school fees. At least I need a housing allowance. When you go to some institutions or departments, what the staff get at the end of the month as allowance is even more than their salary, but for us teachers, we solely depend on our salary. You see a driver working at audit, he takes more than me. A driver who completed form 4 and is employed as a driver at audit service, he takes more than me. I have attended 'O-level', 'A-level' and I have completed university, so, you can imagine the frustration".*
- *"My younger brother who got a job at Ghana Police Service, the amount the guy is making I am not getting up to that. You teach, what do you get? When you decide that you want to go private studies, they say you can't go. If for example I leave this campus to organise private classes somewhere, management will say no. At least if they know it, they will say no. The school authorities will not*

allow me to go. Even when the student is ready to pay, they will say no, so, there is no extra income and so it is very frustrating".

- *"If all the needed resources are put in place. Then also, other things like accommodation that help the teacher to get our comfort to teach are being put in place, then why not. Most teacher even love to teach because teachers are leaving the teaching field all because not necessarily the salary but to some extent, they see that the system itself is frustrating in terms of even accommodation and also sometimes how GES rules. It's not straight forward but if all these things are put right then teachers are there, we love teaching".*
- *"I know it is a shame to say more salary or that we need more money but that is the simple truth. Also, as a teacher, I feel the type of school you find yourself in play a vital role. For example, if you are in a grade A school, there is no way you will not pull your weight to perform well, because the students are so smart. Their schools are well resourced with textbooks but when you come down to our rural schools, you will see that the students are so unconcerned or there are just no facilities to help them in any way. There are no ICT computers for them to even go and research know more about a topic. So, I think the facilities and resources in this school should be improved".*
- *"I think to me personally, to be more motivated, I think if the classroom is more modern …if we have a more modernized classroom, it will speed up learning on my part because, the subject I teach is more of discovery. You must discover content for yourself, and I don't have that. So, I think if that is done, it will motivate me to do my best".*

3.8.2 Share of secondary school teachers reporting improvements in their own well-being (access to high quality key services, life satisfaction, food, security, and safety)

This section provides an analysis of SEI teachers' self-report of improvement in their own well-being. Data on teachers' well-being was collected for the first time in 2022. The Mastercard Foundation defines well-being as a combination of objective access to services and subjective perspectives that capture the extent to which an individual is leading a healthy, happy, and fulfilling life connected to one's family, friends, and community. Studies[13] have shown that teachers' well-being exudes a positive emotional state, which strongly influences their teaching and student performance. In computing the share of teachers reporting an improvement in their well-being, the study adopted the Office of National Statistics (ONS4) questionnaire with additional questions related to Ghana-specific requirements agreed upon by stakeholders. The questions for measuring the indicator were self-administered by teachers in SEIs. The self-administered items measure different aspects of a teacher's life, including happiness and life satisfaction, mental and physical health, meaning and purpose in life, character and virtue, close social relationships, and financial and material stability. The self-administered items were scored on an eleven-point scale from 0 to 10, where 10 was a total agreement with the statements while 0 was a total disagreement with the statements.

The scoring criteria adopted the personal well-being score (PWS)[14] , which categorised the eleven-point scale into four categories, namely, 0-4=Low, 5-6=Medium, 7-8=High, and 9-10= Very high. For the purposes of the indicator, teachers who obtained a score of 7 to 10 (High/Very High) were reported as satisfying the criteria of the indicator. Results on teachers' well-being are shown in table 3.40.

Results on teachers' well-being show that over half (58.1 percent) of the teachers are satisfied with the status of their well-being. A point-biserial correlation showed a weak relationship between teacher motivation to teach and their well-being (corr. Coef. of 0.27). The results did not show any significant difference among school types, sex of teachers and school categories. See table 3.40.

Table 3.40 Teachers satisfied with their well-being (%)

Demographics	2023
Sex	
Male	56.5
Female	62.0
School category	
Category A	36.8
Category B	66.7
Category C	58.3
Years of teaching	
Less than 5 years	72.1
5 to 10 years	59.0
More than 10 years	52.5
Overall	58.1

Table 3.41 shows that financial and material stability as well as happiness and life satisfaction had the least proportion of teachers agreeing with such a statement. The main reason teachers gave for the low scores was that the status of their finances had been impacted, which had also affected their happiness.

[13] https://www.schooleducationgateway.eu/en/pub/resources/toolkitsforschools/subarea.cfm?sa=601
[14]https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/methodologies/personalwellbeingsurveyuserguide

Table 3.41 Extent to which teachers report improvements in their well-being (%)

Teacher well-being criteria	*2023*
Character and Virtue	
Teachers who act to promote good in all circumstances, even in difficult and challenging situations	*89.2*
Teachers who are always able to give up some happiness now for greater happiness later.	*89.7*
Meaning and Purpose	
Teachers who feel things they do in life is worthwhile	80.8
Teachers who understand their purpose in life	91.6
Mental and Physical Health	
Teachers who describe their mental health as excellent	92.1
Teachers who describe their physical health as excellent	83.0
Close Social Relationships	
Teachers who are content with their friendship and relationships	82.0
Teachers whose relationships are as satisfying as they would want them to be.	76.7
Happiness and Life Satisfaction	
Teachers satisfied with life as a whole	32.2
Teachers who describe themselves as happy	45.2
Financial and Material Stability	
Teachers who do not ever worry about safety, food, or housing	33.9
Teachers who do not ever worry about being able to meet normal monthly living expenses	33.2
Overall	58.1

3.8.3 Teachers in SETP schools displaying competencies in NTS

3.8.3.1 Percentage of teachers in SETP schools displaying core competencies in the NTS

The National Teachers' Standard (NTS) is divided into three main domains and subdivisions, as depicted in box 3.1. Three tools were used to collect data for measuring the NTS: a lesson observation tool, a teacher follow-up interview, and the SETP school student triangulation tool.

Box 3.1. Main domains and subdivisions of the NTS

- Professional Values and Attitudes
  - Professional Development
  - Community of Practice
- Professional Knowledge
  - Knowledge of Educational Frameworks and Curriculum
  - Knowledge of Students
- Professional Practice
  - Managing the Learning Environment
  - Teaching and Learning Assessment

To determine the mean percent composite score for a teacher, the three tools are triangulated, and a score is assigned based on the teacher's performance. As a requirement for the indicator, teachers who obtain a minimum composite score of 75 percent are classified as satisfying the criteria of the indicator.

For example, for the lesson observation, if a teacher obtains an average score of 3.2 of 4 (the maximum score attainable), this will be equivalent to 3.2/4*100 or 80.0 percent. For the teacher interview, if a teacher attained a total score of 45 of 63, this would be equivalent to 45/63*100 or 71.0 percent. For learner triangulation, if students had an average score of 2.8 (of 5), this would be equivalent to 2.8/5*100 or 56.0 percent. Therefore, the composite score for the indicator would be (80+71+56)/3 or 69.0 percent.

Table 3.42 presents the percentage of teachers who displayed core competencies in the NTS during their lessons. The results show a significant increase of about 20 percent at 2023, especially since none of the teachers demonstrated NTS at baseline. The results further showed that teachers from category B schools fared better compared with teachers in other categories. Table A2.15 in annex 2 also shows the analysis at the school level. As noted, Benso SHTS had the highest (43.8 percent) proportion of teachers demonstrating NTS followed by Bolgatanga SHS (37.5 percent).

Table 3.42 Percentage of teachers in SETP schools demonstrating understanding and application of the NTS (%)

Category	2022	2023
Sex		
Male	0	18.7*
Female	0	22.0*
School category		
Category A	0	37.5*
Category B	0	43.8*
Category C	0	14.9*
School sex		
Mixed-sex	0	18.2*
Single-sex	0	33.3*
Overall	**0**	**19.4***
	179	**180**

*p≤0.05

Table 3.45 presents the progress made by teachers in the demonstration of NTS from 2022 to 2023. Teachers who demonstrate NTS excellently satisfy all the minimum criteria in table 3.46. Teachers who were classified as "good" demonstrators satisfy majority of the minimum criteria, while "fair" demonstrators satisfy about half of the minimum criteria for each competency.

In 2022, none of the SETP teachers achieved an excellent demonstration of NTS. However, in 2023, the percentage of SETP teachers who demonstrated NTS excellently increased to 19.4 percent.

For "good demonstration", 40.2 percent of the SETP teachers met the criteria in 2022, which remained almost unchanged at 40.0 percent in 2023.

In 2022, majority of the SETP teachers fairly demonstrated the NTS, this has reduced to 40 percent in 2023.

Overall, the table indicates progress in the demonstration of NTS by SETP teachers between 2022 and 2023. The percentage of teachers demonstrating NTS excellently increased, while the proportion of fair demonstration decreased.

Table 3.45 – Progress in SETP teachers' demonstration of the NTS in their lessons – (%)

	2022	2023
Excellent demonstration	0.0	19.4
Good demonstration	40.2	40.0
Fair demonstration	54.2	40.0
Poor demonstration	5.6	0.6

Table 3.46 presents teachers who satisfy the criteria of the competencies of the lesson observation. As shown in the results, there was a significant increment in all the competency areas except for two competency areas. These two include "Teacher exhibits ethical teacher codes of conduct during the lesson delivery" and "Pays attention to all students, especially girls and students with special educational needs, ensuring their progress".

The results reveal significant progress in the transition of teachers on specific core attributes of the NTS competencies. The competencies with the most significant progress from 2022 was teachers' "Create a safe, encouraging learning environment". This competency improved by about 30 percent compared with the 2022 result. Reports from field observes showed that generally, teachers were warm and friendly to students, in most cases, the teachers praised the students for even wrong responses and ensured the students were confident and unafraid to ask questions. Some reports from enumerators are cited below:

- *"The teacher was warm and positive to all learners, created a good atmosphere for learners, not intimidating the students and encouraged all students to contribute"*
- *"The teacher demonstrated patience to students, was friendly and provided a lot of guidance to students in answering questions and asking questions. Students felt confident to ask questions without intimidation."*
- *" Teacher made learners to clap hands for those who answered questions in class."*
- *"Students who were disturbing were spoken to gently. A student tried to go out without asking for permission and the teacher called him back and asked him to do the right thing and he quickly apologised and asked for permission before he was allowed to go out. The teacher was full of praises for students who contribute in class. Students could ask questions without being afraid of the teacher."*

Despite these positive feedback on teachers creating a safe environment for the students, there were some reports of teachers not demonstrating patience, tolerance and lacking the proper ethical standards required for meeting the NTS criteria. Enumerators reported that some teachers shouted at students, shamed them for wrong responses and threaten some students as well. Though these incidences were minor in the SETP

schools. It is important that teachers are reminded to adhere to all the standards required from them. Some negative reports from observers are cited below:

- "Generally the teacher was not intimidating, he was warm and receptive. However, his voice was too loud and might be the reason why learners didn't ask questions or contribute."
- "The teacher didn't demonstrate patience, was not tolerant enough for the students and the dressing for the class was a bit casual"
- "The teacher did not do well in handling some of the responses of the students. For example, he used 'SHAME ON YOU!' after a student failed to give a correct answer to a question."
- "The class was tense and intimidating. At the beginning of the lesson, the teacher attempted to test the previous knowledge of students through questions but no student responded. During the group work he kept shouting 'keep quiet'."

Another improvement was recorded in teachers using a "variety of teaching and learning resources that enhance learning, including ICT." The results showed an improvement of 29.4 percent from zero in the 2022 survey. Based on reports from observers, some teachers satisfactorily demonstrated and used learning resources during lessons. For example, in Gambaga Girls SHS, a teacher was observed using a mobile phone, blender, bottled water and a thermometer to demonstrate his explanation of some science concepts. Also, in Ogyeedom Community SHTS, a teacher was observed using laptop and projector to show videos to students. Furthermore, in a few of the schools, teachers brought magazines, newspapers and card boards to the class. In an interesting observation, a teacher who did not have a projector showed pictures to students with his smartphone by passing them around from one student to another.

While these examples show an improvement in teachers' adaptation to learning resources, the majority still used a lecturing approach and did not make use of the white boards effectively. Some enumerators observed an intriguing finding. They reported that some teachers brought laptops to the class, but the laptops were only used to read prepared notes to students. As reported, these teachers did not use the whiteboard but read it out from the laptops to the students. While it is admirable and progressive that teachers are innovating in the use of ICT, it must ultimately benefit students' learning outcomes. Efforts should be made to remind teachers of the proper use of ICT to benefit the students.

The results in table 3.45 also show marginal progress in the areas of "Using a variety of assessment modes to support teaching", "Paying attention to all students, especially girls and students with special needs (SENs)" and "Employs a variety of instructional strategies that encourage student participation and critical thinking". It is important to note that these three competency areas had the lowest scores and are important areas to address.

Concerning the use of assessment varieties, the observers reported that the main aspect of the competency the teachers adhere to is to "ask students if they understand what has been taught", this is evident as 81 percent of the teachers were rated good/excellent in demonstrating this sub-competence. Other important assessment modes, such as the use of peer assessment, the use of traffic lights for groups to indicate how they are dealing with a task and the use of student votes to determine their level of understanding, were only used by less than a fifth of the teachers.

Regarding paying attention to all learners, including girls and those with special education needs (SEN), the standards require that teachers ensure that students with disabilities are seated in positions that ease their learning abilities. Teachers are also to ensure that students who are quiet and non-participating are made to contribute in class. Also, teachers are required to give an equal chance for girls and boys to ask questions and respond in class. Fourthly, teachers are to give appropriate resources to students with SEN and also find out why students are absent from class. According to the observers, the most common attribute about a third of the teachers adhered to was, giving equal chances to all students and asking about

absentee students. For example, in Bolgatanga SHS, an observer reported that the teacher *"called on quiet students to read portions of the passage used for the lesson delivery. She also called the quiet students to see if they had questions to ask or wanted to express an opinion on issues or comment on answers provided by their classmates. She also distributed questions to groups fairly, and passage reading was done in turns."*

Based on field reports, very few teachers provided extra support to students with SEN. These teachers enabled the students to sit in the front row of the class. Some of these schools are Bolgatanga SHS, Ogyeedom Community SHTS and Bosome SHS. In very few of the schools, the observer reported that the teacher, in a follow-up interview, admitted that he had no knowledge of how to handle SEN students. It is essential to reorient teachers' knowledge through PLCs in handling SEN students.

On teachers "Employs a variety of instructional strategies that encourage student participation and critical thinking", a critical analysis of the results shows that the most common strategies teachers use in class include the use of question and answers, the use of whole class dialogues and the use of group or peer work for collaborative learning. Other important aspects of the competency that very few of the teachers use include the use of games during lessons, the use of role plays and storytelling, the use of presentations by groups and the use of ICT to present works. These competency areas are important and useful instructional strategies which are infrequently used by teachers during lessons. It is essential to draw teachers' attention to the use of these techniques during lesson delivery.

Table 3.46 Teachers who satisfied the criteria of sub-competencies in the lesson observation (%)

	2022	2023
Teacher exhibits ethical teacher codes of conduct during the lesson delivery	59.8	63.9
Creates a safe, encouraging learning environment	34.6	64.4*
The teacher listens to students and gives constructive feedback	34.1	57.8*
Understands how children develop and learn in diverse contexts and applies this understanding in their teaching	15.1	29.4*
The teacher demonstrates effective, growing leadership qualities in the classroom	10.1	29.4*
Teacher use of age and grade(s) appropriate strategies to enact in the lesson	2.8	16.1*
Explains concepts clearly using examples familiar to students	2.2	15.6*
Pays attention to all students, especially girls and students with special educational needs, ensuring their progress	1.1	4.4
Uses a variety of assessment modes during teaching to support learning	0.6	4.4*
Employs a variety of instructional strategies that encourage student participation and critical thinking	0.0	7.2*
Produces and uses a variety of teaching and learning resources that enhance learning, including ICT	0.0	29.4*
Total (N)	**179**	**180**

*p≤0.05

Understanding the relationship between teacher quality and student outcomes using SETP data

Table 3.47 illustrates the relationship between quality of teaching (measured here using NTS) and student performance across the SETP schools.

The results suggest that improvement in teaching quality by SETP teachers is positively correlated with an increase in student performance in different areas, such as reading literacy, science literacy, and 21st century skills.

However, the relationship between teaching quality and student performance is complex. While some schools showed both high teaching quality and significant improvement in student performance, others, like Bosome SHS and Ziavi Community SHTS, demonstrated improvement in student performance without a corresponding improvement in teaching quality.

Furthermore, the variance in results across different student performance areas - even within the same school - suggests that teaching quality might have a differential impact on student performance depending on the specific subject area or skill.

Table 3.47 - Teachers who excellently demonstrate NTS and the corresponding change in student performance (i.e. % transitioning to higher proficiency levels) by school

	SETP teachers' demonstration of NTS (% change between 2022 and 2023)	Reading literacy (% change between 2022 and 2023)a	Science literacy (% change between 2022 and 2023)	Mathematics (% change between 2022 and 2023)	21st century (% change between 2022 and 2023)
Benso SHTS	+43.8*	+34.3*	+11.9	-6.2	+11.6
Bolgatanga SHS	+37.5*	+3.4	+40.6*	+3.7	+23.8*
Bosome SHS	+0.0	+10.1*	+15.4*	-3.5	+5.8
E.P. Agriculture, Tatale	+33.3*	+8.9	+28.1*	-4.6	+4.7*
Gambaga Girls SHS	+33.3*	+9.2*	+16.4*	+4.6	+4.5*
Lambussie Community Day SHS	+7.1	+21.3*	+24.0*	+6.1	+4.2*
Mangoase SHS	+7.1	+25.1*	+16.2*	-8.5	+4.1*
Nabango Community SHS	+13.3	+26.5*	+21.9*	+7.3	+2.5
Ogyeedom Community SHS	+13.3	+43*	+25.9*	-7.0	+3
Walewale Vocational Technical	+33.3*	+4.7*	+16.3*	+7.8	+3.5
Zabzugu SHS	+6.7	+25.1*	+8.1*	+5.7	+4.7*
Ziavi Community SHTS	+0.0	+17.5*	+29.8*	+5.9	+4.2
Overall	**+19.4 ***	**+16.7***	**+24.5 ***	**+2.4**	**+10.3***

*p ≤0.05

a – This refers to the percentage of students transitioning from lower proficiency to higher proficiency levels i.e. approaching proficiency and above.

Multiple regression analysis was conducted to determine the relationship between the demographic characteristics and the NTS scores obtained by teachers. Based on the output results in table A 2.18 in annex 2, teachers in category C schools obtained significantly lower scores compared with teachers in category A schools.

3.8.3.2 Insight from SETP school teachers on how they demonstrate the NTS during lessons

Case 1

The first insight is about a teacher who described how he demonstrates NTS during lesson delivery. He explained that even though he is not yet perfect, he tries to introduce his lesson by doing a recap of previous lesson to assess students' level of understanding and recollection of previous lessons. He also indicated that he links the topic of the day to some practical to help his students to link what he is teaching to what they see during practice. He acknowledged that demonstrating an understanding of the NTS in his lesson delivery has helped his students to understand lessons more effectively as he conducts various types of assessment such as verbal assessment, one on one assessment, and class and home assignments to check their understanding. He added that if students have any difficulty in understanding any lesson, he applies different approaches to help them such as spends additional time with them, peer learning or referring them to other teachers in the department. Below is a vivid narration of how the teacher he applies the NTS in his teaching:

"In my teaching, I always make sure that I am on time for the lesson. Before starting a new topic, I try to determine the level of students' understanding during my lesson introduction… which is by going back to what they have learnt before. Afterwards, I guide them through some practical and link them to the lesson. It's all about how you link up your teaching methods and all that, so those are the things we started practicing small-small. In terms of how the students reacted to my application of the NTS, of course, when I started earlier, I couldn't do it perfectly so at the initial stage, it was like they were a little bit confused. But then when I understood it a little bit more, they became okay with it. Now, they have realized that going back to the previous lessons is good. So, they really recommend that I do that all the time because it helps them not to forget what they've learned 2 or 3 days ago. I feel proud of it because if you can fix A and B, you will be happy that you have done something, and you will be glad that your students have understood. After every lesson, if I want to know that the lesson has been successful or ensure that the students understand, I definitely have to ask questions. For example, verbal assessment… how they answer your questions, when you give them small assignments to write, when you mark, definitely the way they will score, at least you will know that this person has understood or not. Maybe a passage that you have taken them through, today we have gone through poetry. I asked them to go through it and explain. If half of them can do so, that will tell you that the lesson should either be done again or move on. After every lesson I have to give a small work in the classroom, I go round, and I assess them. If the students are having difficulty with any part of the curriculum, you must sit with them after classes, take them through and when you realize that he or she is not getting you, at least you can assign a fellow student, maybe, to explain more to him or her. If it is still not working, like I said, there are three of us in the department so I can at least refer her or him to a different teacher to see how it goes".

Case study 2

An English teacher described how she typically applies the NTS in her lesson delivery. According to the teacher, she takes her time to prepare for the lesson. During lesson preparation, the teacher revealed that factors such as students' level of understanding, grade level, and use of appropriate teaching methods are taken into account. The teacher stated that she conducts a recap of previous lessons at the start of the lesson to ascertain students' previous knowledge before introducing the day's topic. During the lesson, the

teacher revealed that she involves students in the lesson by asking them to take turns to read to assess them and help them improve their literacy skills. Students are also assessed through assignments and class exercises. Below is a verbatim quote from the teacher:

"As a teacher, you must first prepare what you are going to teach. You have a lot of preparation to do, so you must plan your lesson. So, you have to take into consideration factors such as your students' level, the methods that you are going to apply in the class, the level in the class whether form 1, form 2 or form 3. And then you know how you start with introduction to revise their previous knowledge and you move on to the topic. And as you are going on with the lesson, you must involve the literacy aspects too. At times you have to assess them by calling the students individually to read and also improve their reading. And after teaching, you have to conclude it by giving them a summary of the lesson, and then you give them an assignment or an exercise to do".

3.8.3.3 Qualitative findings on teachers' demonstrating an understanding and application of the NTS

As seen from section 3.10.5.1, about 20 percent of the SETP teachers are demonstrating the core competencies in the NTS during the lessons. To gain further insight into the reasons behind this improvement in teachers' demonstration of these competencies, qualitative interviews were conducted with the SETP teachers. Insights from the SETP teachers revealed that the below factors accounted for the improvement in the SETP teachers' demonstration of an understanding and application of the NTS. The factors include:

PLC Sessions

The SETP school teachers indicated that the PLC sessions being organised in their schools which they attend weekly have helped them to improve upon their lesson and incorporate the NTS competencies in their lessons. First, the teachers provided insight into how the PLC sessions are organised in the schools and what they learn at PLC sessions. They stated that the sessions are organised weekly and sometimes in their various departments. According to the SETP teachers, these sessions serve as an engaging forum where they can exchange ideas, learn innovative strategies, and collaboratively solve the pedagogical challenges they encounter in the process of delivering their lessons. In more specific terms, they shared that the PLC sessions have introduced them to new teaching methods that are more student-centred, such as group work and various assessment methods. They noted that these approaches facilitate a more interactive and inclusive learning environment, promoting peer-to-peer learning and allowing for continuous evaluation of students' progress.

Some quotes from the teachers below:

- *"As I said, this PLC is here to build the teachers, in-service training and I am here, and I am part of the teaching personnel. So, I will say that it has improved my teaching because when we meet, we have the experience of sharing ideas and the inexperienced ones, the in-service people, we learn from them. How you divide your lessons, how you use objects, how you incorporate ICT and these types of things. How you build on your...the students, you pay attention to the literacy aspects. Learning from other colleagues has really helped us".*
- *"… One thing I learnt, when you are coming to teach, you write the objectives of the things on the board. That is one thing that we learnt that the students are supposed to know what they have to learn at the end of the lesson".*
- *"In fact, I learnt a lot because I realized that there are people that are needed to help students. In fact, sometimes we think that a dubious student should be sacked but I realized that those students need to be counseled, followed up, sit with them and they will improve, and it helps a lot".*

- *"Last term I think we were up to, I think the first two weeks that we started, the rest of the week we did it. It is based on departmental PLC so the department will meet its members for PLC every Wednesday".*

The teachers explained how their involvement in the PLCs has significantly reshaped their teaching styles. For example, they now pay attention to students' literacy abilities, emphasising that reading and writing are fundamental skills that their students must possess. They have adjusted their teaching schedule to spend more time on literacy, providing more exercises and tasks to improve these skills.

The SETP teachers also indicated that they have moved from emphasising individual tasks to placing importance on group work. Instead of having students work individually, they have begun to instil a culture of teamwork and collaboration in their classrooms. They believe that this approach not only encourages communication and interaction among students but also fosters a more holistic understanding of subjects through varied perspectives.

The teachers further pointed out that the PLC sessions have been instrumental in encouraging them to harness the power of ICT to improve their teaching methods. This involves integrating a variety of digital tools and multimedia components into their lessons, which serve not only to engage different learning styles but also to make lessons more dynamic and interactive. They provided specific examples of how they implement ICT and digital literacy tools in their classrooms. Laptops, for instance, have become essential tools for their instructional practices. They leverage these devices to delve into extensive research on various concepts, collate information, and prepare comprehensive lesson plans. In addition, they mentioned using projectors regularly to visually present content to their students. Below are some quotes from the teachers.

- *"21st century skills, madam you know, English teachers lead students to discussion and group work. So, he will just give the group's work on it after which one of the members of the group will be called to do the presentation. So, with this, the students learn leadership skills and there is also collaboration. As they work together, and critical thinking because there are some topics that the students will have to think so that they get answers for the work that they have been given. It has also built their confidence level as they are able to speak".*
- *"At first when I was grouping students, I didn't take into consideration their abilities. But I have gotten to know that, anytime that I am grouping students, their abilities should be taken into consideration. And I also shouldn't use words that will make others feel less in my class. I should make them feel that they are one. I should also pay special attention to students with special needs".*
- *"My favourite PLC topic was how to incorporate ICT in our teaching. So, I started by using my own laptops. In chemistry, we have some topics that are very abstract. abstract things, you can never see so you must conceptualize it, form the ideas before you begin to get it. So, when they use the ICT, we train them on how to bring some abstract things to the real-life situation. We show them objects, real demonstrations for them to understand it. So, incorporation of ICT to learning had really helped us".*
- *"When we started with the literacy aspects, we learnt that anytime that you are coming to teach a lesson, you must let the students pronounce the words and pay attention to their writings. So, what I did was that, anytime that I go to class, sometimes I dictate the notes. And after, I ask at least 2 or 3 students to read. When they are reading, you will see that there are some mistakes so, when you see that, you must correct them. Sometimes too, I will write it on the board for them to write it and sometimes, I will read, and they will also read after me. That is for the literacy part".*
- *"For me, I can say my teaching approach has changed in the sense that, at first maybe you were teaching with…sometimes the teacher will be in the class and after class, giving exercises to*

students to do. And that one too, some students copy. So, nowadays, we group them, and we give the exercise for them to discuss it in their groups and later they come and explain to the whole class for them to listen".

- *"Fantastically! It has and an example is just, in the reading for instance, in comprehension, instead of you waiting for one student to read and then the rest will be sitting, there is a method where they read full stop to full stop. You read to a full stop and then the next person sitting by you will continue so it means that there is no way any student will not read so it is a very good thing".*

The teachers, in detailing their experiences, emphasised how the application of the NTS in their lessons through the PLC sessions have notably influenced their students' behaviour and attitudes towards learning. They spoke about the newfound sense of autonomy they have seen flourishing among the students - a significant shift from the previous paradigm where the onus of directing learning was primarily on the teachers.

Before, students tended to be passive recipients of knowledge, largely relying on their teachers to dictate the pace and content of the lessons. Post-PLC, however, the teachers observed that the students have become more proactive in their learning process. They began taking the initiative to delve into topics, showing a willingness to explore beyond the set curriculum, asking insightful questions, and displaying an eagerness to learn that was not as apparent before.

In addition to the enhanced autonomy, the teachers also noticed an upswing in the students' interest in their lessons. They shared that this change became apparent when they began implementing some of the strategies learned in the PLC sessions - like the use of ICT in lesson delivery and the incorporation of more group work in their teaching.

According to the teachers, the shift to more group-oriented tasks also contributed to increased student engagement. Collaboration in group work stimulated communication and interaction among the students, and they seemed to relish the opportunity to learn from and with each other. This shared learning experience further sparked their interest in the subjects. Below are some quotes from the teachers:

- *"Madam, what I have noticed is that there was a time that I went to the class after having a meeting. But when I went to the class, I saw one of the students standing in front of the class teaching. At first, they weren't doing that".*
- *"When I introduced the videos, when I used my own laptop to show them 1 or 2 things, then they will be happy. When I was teaching this topic, radioactivity. So, I showed them how full radiation is being done and they were very happy to see it. They were even encouraging me to always being the laptop to class".*
- *"There are days that a teacher might, may not be in class but because they have learnt the grouping method and all that, one of them will just pick a topic and they will discuss and so you go to the classroom, and you see them discussing and so it helps a lot for them to also".*

The observations shared by the teachers were corroborated by the students themselves. The students were aware that their teachers attended a meeting on a weekly basis. Some curious students had inquired about these meetings and were informed by their teachers that these were sessions to help them improve upon their lesson delivery. The students further revealed that they have indeed noticed changes in their teachers' approach to teaching. They noted a shift from traditional teaching methods to more innovative, engaging, and interactive pedagogical strategies. They highlighted some specific changes they had seen in their teachers' methods. They reported that their teachers are now using ICT during their lessons. From

showcasing videos to explaining complex concepts, the teachers have managed to make the learning process more dynamic.

The students also noted the increased focus on group work. They mentioned that they are now more frequently divided into groups for discussions and tasks. They agreed that this approach has made learning more interactive, fostering a sense of teamwork and allowing for different perspectives to be shared.

Furthermore, they commented on their teachers' newfound attention to individual student abilities and needs. The students noted that the teachers are now more patient, more observant, and more willing to provide additional help when needed. This tailored teaching style has made the students feel more valued and supported in their learning journey. Below are some quotes from the students:

- *"When we came at first, when the teachers were teaching, they didn't use any instruments for practical but now they are having materials for practical especially if you are doing science and there is a practical, we are supposed to do, there are instruments, so we do it".*
- *"I have observed that since we came last year, the teachers have been organizing us in groups which enables us to learn so we the students, those who were not learning seriously, you see that those groups have helped us a lot".*
- *"Especially general arts class, there was a day that they were treating some topic, volcanic…and that day our master projected it on the projector so seeing the pictures and how things appeared, it has stuck in our minds, and we can still remember it. Even if they didn't teach us anything because we remember the projection it made us remember the things".*
- *"The teacher gives us a brief about the topic and so when he comes to class, by the time he comes to class we have researched about the topic and so when he comes, he asks questions about how we made the research so when we are able to tell him then he puts us into groups. We have three groups so when we are able to tell him then he brings some pictures. For the revision of the pictures, even if you are to forget the demand but through the picture you are able to tell the meaning."*
- *"Let's say at first, whenever the teacher teaches, I don't get to understand but they going to the PLC meeting, for me, they teach so that I can understand the concept. And let's say, some of the teachers, whenever you don't understand something that they have taught, they do online research for us to understand. And they also bring pictures for us to understand."*

Monitoring by SETP school management and the establishment of monitoring committee

The SETP teachers appreciated the increased involvement of their school management and monitoring committee. According to the teachers, their school management set up a monitoring committee who are responsible for monitoring teaching and learning in the schools. The teachers indicated that these monitoring committee together with school management conduct surprise visits to the classrooms to observe lessons. This shift in monitoring strategy has kept the teachers on their toes, promoting vigilance in their teaching methodologies and ensuring consistent quality in their lesson delivery.

One aspect that the teachers particularly appreciated was the personal feedback provided by the management and monitoring committee following their lesson observations. Instead of a generic evaluation, the feedback was customized and relevant, addressing specific aspects of the teacher's lesson and delivery method. This feedback was not delivered in a public or group setting but instead given one-on-one. This personal approach ensured that feedback was received in a non-threatening manner, promoting a healthy dialogue between the teachers and the management.

According to the teachers, this increased monitoring and involvement by the management have fostered a supportive and conducive environment for teaching and learning. It's seen as an active commitment to

improving teaching practices and ultimately enhancing student learning experiences. This ongoing monitoring not only ensures that the quality of education is upheld but also encourages a culture of continuous improvement and professional development among the teachers.

The teachers indicated that the monitoring is not only done by management and the monitoring committee but also by their own colleagues who they referred to as “critical friends”. According to the teachers, they each have “critical friends”. These critical friends are their peers who are assigned to observe their lesson and provide feedback. The teacher indicated that this feedback mechanism played a pivotal role in helping them refine their strategies. Below are some quotes.

- *“Yes, they have a monitoring committee who go around to check if the teachers are reporting to class, they also have some monitoring resources in place, such as attendance sheets. sometimes we have them in class. you need to make sure that you sign and then they also have meetings with students to take feedback on the teacher’s performance”.*
- *“Yes, I think it’s the headmaster and then the head of academics. So, he will come and sit behind you and observe your lesson. He told me that I did well and, I am supposed to question students, especially students who do not come in early because I was teaching, and a student came in and I didn't mind him. So, I was asked to question them next time when they come in late. I felt okay, it is ok”.*
- *“Every morning he goes round, and we have a register, when you teach you sign and certain times when you don’t attend your classes two or more times you are invited to explain why you were absent and when students complain about you, you are invited to explain”.*
- *“Normally the school leadership does not do it; it is usually the head of departments that do it. They go to the class and observe the teacher. When he finishes then the head of department will now sit together and say oh you should have done this, you should have done this, when you entered you should have started with this. You don’t enter a class and start teaching; you need to throw a question for the students to come out before”.*
- *“It is because several times I have met teachers sitting to discuss or maybe you ask one person to just sit in your class and observe your lesson and they move on so before you even move on to do a topic, one or two people from your department will sit and observe and then after that, he or she will critique your lessons, so it helps”.*

During the FGD with students, they echoed the sentiments shared by the teachers. The students observed that their headmaster or headmistress, as well as assistant school heads, had been more present in their classrooms, coming in to observe their lessons. The students further indicated that when the school management pays a visit, they quietly take a seat at the back of the classroom, allowing the lesson to continue uninterrupted. This silent observation, according to the students, doesn't disrupt the flow of the class; instead, it amplifies their attentiveness and engagement. Knowing that they are under the observation of the school heads, the students feel a heightened sense of responsibility and seriousness towards the lesson. Below are some quotes from the students:

- *“The headmaster coming to the class to check if there is a teacher teaching in the class or not. Because when the headmaster doesn’t care about you, he won’t even make time for you or come to the class to check if there is a teacher or not. So, you the student will relax because if the headmaster doesn’t care, why should you also care? But when he come to the class, you the class prefect wouldn’t waste time to go and look for the teacher when he hasn’t come to class. So, when the headmaster comes to the class, he encourages us because he has made time out of his busy schedule to come to the class to check whether there is a teacher or not.”*

- *"Now, they have made a register for every class. At first, it was marked only in the morning till the next day but now, for each period, they mark the register. The teacher for the period signs after teaching and it got to a time that they wanted each student to also sign after every period. So, the class prefect in every class makes sure they mark all the students in class who are present in class and those who were not there. So, if you are absent two or three times, you will be called to ask why and you don't give any tangible reason, it will go against you. Because of this, no one is absent from class, always being active in the class and the motivation from the teachers too is helping us, loving them and we are living together. Through that, it is helping us in everything especially in our studies".*
- *"Our senior housemaster and mistress is very strict to the extent that you can't get the chance to move out anyhow even though we do not have an entrance. Even with exeat, you need to have a tangible reason before you can be given one".*

Student Enthusiasm

The teachers found motivation in their students' enthusiasm and joy when they used interactive strategies from the NTS. According to the teachers, the positive response from the students fuelled their desire to incorporate more of these engaging techniques into their lessons. Whether it was group work, use of ICT, or problem-solving activities, the students' eagerness and involvement were palpable. This level of enthusiasm was a tangible confirmation of the success of these strategies, making the teachers more confident in their decision to adopt them. Below are some quotes form the teachers:

- *"The only feedback I can say is when they are interacting with me, how they approach me with questions and at times, they even work on their own and bring it to me for me to go through for them. But for them to give me feedback on my teaching, I have not received that. But I can deduce that one from their interaction with me. Some, engaging me after school for extra teaching. Yes, that means they are learning, asking me a lot of questions, visiting unfamiliar areas means they are reading. Just recently when I went to class, I wrote on board something, and I asked them to identify words that they are familiar with. To my surprise, they were able to identify more than necessary which means they are reading because, I have been encouraging them that they should be reading".*
- *"The interest of the students has changed drastically. Initially I was a teacher teaching few home economics classes and majority of them are ladies. And there is this mindset about how difficult Maths is and when we came in, there where this problem of them even trying to develop interest for the subject but after we have gone for the program and came back, and then we applied those methods that we were thought to teach them , they realized that some of the concepts were more practical than before so most of them decided to develop the radical approach the more advancing approach in learning the subject and developing interest In mathematics than it used to be. Because initially when you go to the class, most of them will be pretending to sleep or not to be feeling well. But because they realized that mathematics is a subject that you can easily pass with ease, based on the method we were guided upon, they now developed a very good interest for the subject which I am seeing an improvement in my teaching as compared to before we had gone for the program".*
- *"They are also punctual to class, and they don't leave as they used to do. They always say madam now your class is very nice. So, you see them coming very early, especially when I am teaching during the first period. Their class is always full because they know I will bring my laptop or that I will put them in groups".*

Interestingly, the students corroborated these observations. They expressed an increased interest in their lessons when their teachers applied these innovative strategies. Lessons were no longer perceived as one-sided lectures, but interactive sessions where they felt a part of the learning process. Their enjoyment was not just restricted to the lesson content but extended to the very process of learning. The transformation from passive recipients of information to active participants in their education brought about a new level of enthusiasm. Moreover, this enthusiasm was not just limited to the classroom. The students found themselves more eager to continue learning even outside of school hours. They would engage in group discussions, further research on topics, and even take the initiative to prepare for future lessons. Below are quotes from the students:

- *"There are a lot of changes going on especially in teaching thus, comparing last year's teaching and this year's teaching. Now, the teachers use 21st century skills such as technology to teach us in the classroom. Some of the teachers bring music boxes to the class, they download some audios and some show videos of things that we want to know. At first, when you answer a question in class and it is wrong, the teacher will discourage you but now, there is an improvement. If you answer a question and you are wrong, the teacher will tell you that you have tried, and he will correct you to do the right thing. They have been putting us into groups and we are given group work, assignments, interventions, and a lot of things".*
- *"From March 2022 to his time, what has happened is that, when the teachers are teaching, they make sure that all the students get the concept before they continue and when they are leaving, they make sure to give an assignment before they leave. They also group us and give us group presentation. This is to build our confidence level so now every student can speak. Previously, I couldn't speak in front of many people but since they started with the presentation in front of the students, it has built my confidence and now most students are not shy of the crowd anymore".*
- *"I will go for social studies. They started with self, and they taught us about self. Because someone couldn't understand better, I didn't understand that topic. But the moment that they introduced the topic, I got to know. And we watched videos on television, and it was made compulsory. This is how they should be teaching always. I like it. That is now I attend social studies class all the time".*
- *"Please, mine was science, under measurement. During practical, it makes you understand something more than the theory. At first, I disliked the topic in general because there is a lot of calculation involved and I had only heard of the instruments but hadn't seen it before. So, when the teacher said now, we will be going to the lab, I was happy. So, we went, and we applied the practical in the book. Each one does the practical and that made me understand it more".*

Challenges some SETP teachers face in demonstrating NTS in their lessons

While overall, 2 out of 10 SETP teachers are excellently demonstrating the NTS in their lessons, the majority were observed to be poorly demonstrating the NTS. The qualitative survey investigated the challenges SETP teachers encounter when demonstrating NTS. In-depth interviews with teachers revealed that some teachers are faced with difficulty in creating an accommodating space for students with special needs. One teacher shared an instance of having a student suffering from a diminutive condition and was frequently ridiculed by other students. Although the teacher tries to encourage and support students with special needs, the teacher revealed that it is a challenging and stressful effort because he must always force himself to go the extra mile to provide support to students with special needs. Some teachers are hindered in the application of NTS due to a lack of digital resources such projectors to display certain conceptual courses. This also pose as a challenge to some teachers in incorporating the NTS during lesson delivery. One teacher indicated that, *"…like I was saying, concerning the ICT part, if we can get projector to project when we are teaching conceptual topics, will help us to make illustrations to students*.

Another challenge faced by teachers has to do with the reticent attitude of students which result in low or no participation during classroom activities hence making it challenging to apply the NTS during lessons. Another challenge highlighted by teachers is that applying the guidelines as outlined in the NTS approach was time-consuming and so they are unable to have time to properly go through what is required as part of the standard. To buttress this, another teacher stated that most students report late to class especially during the early morning 7 o'clock class. It was revealed from other interviews that students report late to class due to a number of factors including going out to town in search of water to prepare for class. As a result, the dedicated time for teaching a lesson is cut short making it challenging to apply the NTS. *"The challenge is, as I said, I have to be there on time. But at times, you might be there on time and the students and not. This is typical especially when your period starts at 7:00 am, you will enter the class and most of the students are late. At times, when break-time is over the same thing happens".* Another teacher mentioned that the long distance required in their travel to school in the morning sometimes makes them late, thereby, cutting down their lesson delivery time. In such cases, they are forced to teach quickly in order to cover the time lost. A teacher also revealed that at times, it is not the students who are late but the teachers due to the long distance from their homes to the school.

A few teachers also claimed that the components of the standards are a lot and so they're unable to properly implement every aspect of the standards. In one instance, a teacher also mentioned dissatisfaction with the discontinuation of corporal punishment, which in his opinion, has led to students doing whatever they want in the classroom. Below are a few verbatims on the challenge teachers encounter in the application of the NTS.

- *"The challenge with the implementation of the NTS has to do with the students with special needs and how to create an accommodating space for such students in the classrooms. Also, some teachers who tend to look down on such students makes it rather difficult in helping students to have a good image about themselves hence giving me extra tasks of going extra miles to create a safe environment for such students".*
- *"The school's lack of projectors makes it quite challenging to display what is being taught".*
- *""Poor cooperation of students due to shyness. At times, you expect most of the students to participate in the lesson, but I don't know if it is because of shyness. When you ask them to contribute, they will be sitting down as if you haven't done anything".*
- *"You know the students they come with a whole lot of excuses. There are others we give them, they come with the same thing we have given them and tell you that they did not even understand. Others will tell you that they give you reasons, I was sick, I was not feeling well because of the food at the dining hall. But they say you cannot have a perfect situation in this world because nothing is constant. Everything is moving. So, we understand but we try. When I realize that this particular group is not helping, I disintegrate the group and reorganize and put them into different group so that they catch up with their colleagues".*
- *"The distance from our house to this place is far and doesn't help us during the raining and dry season. The dry season, the car will pass by you, by the time you get here, your dress is dusty. And the raining season too, the stagnant water, the car will splash muddy water on you, and you will be dirty. Sometimes, you come to school, and you [have no choice but] have to re-wash your clothes. The last one is, sometimes there will be some little accident on the way and you have to return home to go and solve it. You want to come… but you can't make it because you have to return home".*

3.8.4 Teachers in SETP schools using digital technologies to enhance their teaching

3.8.4.1 Percentage of teachers using digital technologies to enhance their teaching

The indicator measures the extent to which digital technologies are used to support and enhance learning in a multitude of ways and with a hands-on approach for students. Digital technologies include electronic tools, systems, devices, and resources that generate store, or process data. Well-known examples include social media, online games, multimedia, and mobile phones. As part of data collection, three assessment tools were used. First, sampled teachers were observed using or referencing digital technologies during lessons based on the measurement criteria (see box 3.2). An interview was also conducted with teachers to triangulate the results of the lesson observation. Finally, students completed a self-assessment to triangulate the results of the lesson observations. For a teacher to meet the minimum criteria for this indicator, a minimum of 75 percent average score is required.

Box 3.2 Observation criteria for the use of digital technologies

- Relevance of ICT to curriculum and topic taught.
- Teacher uses digital technology to support learning in a multitude of ways, a hands-on approach for students.
- Gives appropriate resources to students with special needs.
- Produces and uses a variety of teaching and learning resources that enhance learning, including ICT.

Based on the results in table 3.48, 10.6 percent of the teachers demonstrated the use of digital technology in enhancing teaching. This improvement is significant given that none of the teachers met the criteria at baseline. The results further suggests that female teachers did comparatively better in demonstrating the use of digital technology compared with male teachers.

Table 3.48 Percentage of teachers in SETP schools demonstrating the use of digital technologies to enhance their teaching (%)

Category	2022	2023
Sex		
Male	0	9.4*
Female	0	14.6*
School category		
Category A	0	0
Category B	0	18.8*
Category C	0	10.8*
School sex		
Mixed-sex	0	11.5*
Single-sex	0	0
Overall	**0**	**10.6***
	179	**180**

*p≤0.05

Table 3.49 illustrates the progress made by SETP teachers in utilising digital technology during their lessons, comparing data from 2022 to 2023.

In 2022, a significant proportion of SETP teachers, approximately 78.2 percent, demonstrated poor utilisation of digital technology in their lessons. However, in 2023, this percentage reduced significantly to just 6.1 percent, indicating a notable improvement.

Regarding excellent demonstration, no SETP teachers achieved this level in 2022. However, in 2023, 10.6 percent of teachers demonstrated excellent utilisation of digital technology in their lessons.

In terms of good demonstration, only 3.9 percent of SETP teachers met the criteria in 2022. However, this percentage increased to 25.0 percent in 2023, demonstrating a substantial improvement.

Fair demonstration shows a significant increase in 2023 compared with 2022. In 2022, 17.9 percent of SETP teachers displayed fair usage of digital technology, which rose significantly to 58.3 percent in 2023.

Overall, the data in the table indicates positive progress in the use of digital technology by SETP teachers between 2022 and 2023. The percentage of teachers demonstrating excellent and good utilisation increased, while the proportion poor demonstration decreased.

Table 3.49 – Progress in SETP teachers' demonstration of the use of ICT in their lessons – (%)

	2022	2023
Excellent demonstration	0.0	10.6
Good	3.9	25.0
Fair	17.9	58.3
Poor	78.2	6.1

Table 3.50 shows teachers' performance and specific competence areas on ICT usage. The results show that the teachers fared significantly well on all the competency areas except for "The teacher uses digital technology to support learning in a multitude of ways, a hands-on approach for students". As reported and explained in section 3.8.5, although there has been a significant improvement in the use of ICT from the 2022 survey.

Table 3.50 Teachers who meet the minimum criteria on lesson observation competencies, by year (%)

	2022	2023
Relevance of ICT to curriculum and topic taught	5.0	21.1*
The teacher uses digital technology to support learning in a multitude of ways, a hands-on approach for students	0.0	1.1
The teacher gives appropriate ICT resources to students with special needs	8.9	16.7*
Produces and uses a variety of teaching and learning resources that enhance learning, including ICT.	0.6	9.4*
Total (N)	179	180

In an interesting finding, there were significant increments in the proportion of teachers who have received training in digital technologies at 2023 by almost 40 percent. The increment is twofold compared with the 2022 survey across demographic characteristics. At the school level, Ogyeedom Community SHS had the highest proportion of teachers (90 percent) who confirmed that they had received training on ICT followed by Walewale Vocational (81.8 percent),table A2.16 in annex 2.

Table 3.51 Teachers who received training in digital technologies in their schools (%)

Category	2022	2023
Sex of teacher		
Male	17.4	50.3*
Female	9.9	63.4*
School category		
Category A	18.2	76.2*
Category B	24.4	59.0*
Category C	12.8	50.6*
Years of Teaching		
Less than 5 years	9.8	52.3*
5 to 10 years	14.7	46.2*
More than 10 years	22.4	60.2*
Overall	15.2	**54.2***

*p≤0.05

Multiple regression analysis was conducted to determine the relationship between the demographic characteristics and teachers' digital technology scores. Based on the output results in table 3.52, teachers with over 10 years of teaching experience obtained significantly lower scores compared with teachers with less than 5 years experience by 5 percentage points.

Table 3.52 Output of multiple linear regression of NTS scores

Category	Coeff (*Sig)	CI
Sex		
Male	Reference	
Female	0.749	-2.362, 3.86
Years of teaching		
Less than 5 years	Reference	
5 to 10 years	-3.195	-6.522, 0.131
More than 10 years	-4.98*	-8.46, -1.5
School category		
Category A	Reference	
Category B	4.973	-1.146, 11.093
Category C	4.128	-0.509, 8.766
School sex		
Single-sex	Reference	
Mixed-sex	1.444	-3.275, 6.164

3.8.4.2 Insights from SETP teachers on how they use digital technology during lessons.

Case study 1

During in-depth interviews, a SETP teacher narrated how he uses digital technology in his mathematics lesson. The teacher mentioned that his school has an ICT laboratory that they have access to for teaching and learning purposes. According to the teacher, he applied ICT when he taught the topic, mensuration in maths. The teacher stated, "Before we had the ICT lab, we had to rely on cardboard cut-outs to demonstrate different objects. But now, with digital technology, I can use the laptop and specialized software to show students 3D models of pyramids and explain their dimensions. It's much more engaging and visually appealing. Additionally, I can demonstrate how to calculate the area of objects with circular bases using the constant pi, which would have been difficult without digital tools. The students really enjoy these lessons because it makes the concepts more tangible and easier for them to grasp.

"There is this topic we call Mensuration, from the word measurement. So, we talked about the area and volume of certain figures, certain structures like the cylinder, the cone and then the pyramid which we develop some from the circle and what have you. So, we use cardboard to model them initially. But since the ICT lab was provided, there is a program on our pen drive [flash drive] that we install on the computer such as models of pyramids and then cones and then the cylinders. They are displayed on the screen for the students to actually see and they can be enlarged so that they see all the dimensions. We also use digital technology to explain to the students how, for instance, the constant pi came about. So, we have a software program that we have facilitators that are on the screen that will explain to them how this 22/7 originated as pi for students to understand. So, any time they see pi, they know it is for this constant. So, there was this software that I use in the classroom, and it was talking about the pi, and they were asking where the pi came from.

The pi is applied when you have a circular object, if can measure the circumference around the circle and you get the figure, let us say, you get 100 and you measure the diameter, the diameter is the line that divide the circle into two equal halves. If you measure it and you divide the circumference over the diameter, you can get a certain figure close to 22/7. Every circular object. That is why if you are solving for the column of the area of the cone, you have the pi because it has a circular base. If you are solving for the area or column of the cylinder, you have the pi because it has a circular base. If you are solving for the sphere, the circle itself, they have this hollow circular base. So, it was this computer program that made the students understand why at the basic level they started with pi as 22/7. So, the that their former Maths teacher used to tell them that, just baba it. Try to memorize it. It is a constant. But the constant emanated from somewhere that is why when you are solving for the column of a cube, you do not apply the pi because there is no circular base there. If we are solving for a square or rectangle, we do not bring in the pi because it has no circular base. But anything that contains a circular base, you must involve the pi. So, this is what we did in the computer lab that has gone a long way to help my students. In terms of how the students reacted to the integration of ICT in the lesson, I will say that they were very happy. So, there are times that even if it does not demand that we go to the lab, they prefer us going to the lab because the lab makes things very real and simplicity to them than being in the classroom".

Case study 2

Another teacher shared her experience of integrating multimedia and other digital technologies, such as laptops and projectors, into her lesson preparation and delivery. The teacher explained that she makes use of platforms like YouTube to show demonstrational videos to students, as well as Google to display relevant pictures related to the topics they are studying, which aids in facilitating their understanding.

The teacher recounted a specific instance where she incorporated ICT into her Economics lesson on the concept of supply. Prior to teaching the lesson, the teacher assigned her students the task of visiting various

food vendors within the school to inquire about the purpose of selling. Following this research activity, the teacher showed the class a video on supply, allowing the students to utilise the information they gathered from their visits and the video to engage in a discussion about the factors that influence demand.

The teacher emphasised that the integration of ICT in her lessons has positively impacted the students' ICT skills. She mentioned that her students have developed the ability to create presentation slides for group presentations and other activities using computers.

Below is a quote from the teacher:

"…I have been using YouTube a lot to get some videos and some of the pictures from google and other stuff. The SETP helped me enough to come out with activities to help them in whatever I teach in their daily lives. For instance, now I go to class with my laptop or sometimes projector for us to do presentation and I always group my students while teaching and we use live experiences. Not long ago I asked my students to go round to those who sell food on campus to find out their purpose of doing that, all because we were about to learn about supply as a topic in economics and I needed them to know in real life what supply really means and not just about the book definitions. So, before the lesson, I ask each student to go round as a project work to find out from the various sellers, their motive for selling, the quantity they supply to the market area to sell and how demand influences the price. At the start of the lesson, I showed them two videos on supply; one was purely on selling in the market setting… how it is being done and one was on how a teacher was teaching supply as a lesson itself. So, I allowed them to watch all of these things before I started the lesson. So, after the short video, I asked them questions by also getting feedback from the assignment I gave them. So, through that then we deduce the meaning of supply, how price influences the quantity supplied and apart from price how other factors influence the technology, the storage facility also influences the supply of the commodity to the market. There have been so many changes in the use of ICT. Now, my students even come for my laptop to do their own thing because I taught them how to prepare slides for presentations. They have now become familiar with the use of laptops, and they have been coming for it. Again, because I have been putting them in groups and they have been having discussions, now even in my absence they are able to learn on their own. I just give them topics to go and discuss and they do it perfectly".

3.8.4.3 Qualitative findings on teachers' demonstrating use of digital technologies

During in-depth interviews, some SETP teachers indicated that the digital resource provided by their schools to support teaching and learning is laptops. The qualitative results indicate that the teachers use the laptops to help them prepare lesson notes. Some teachers revealed that they use the laptop for research purposes and to download learning materials. A teacher revealed that aside the use of the laptop, he uses his personal mobile phone to assist him during lesson delivery. The teachers then proceeded to provide examples of how they are now integrating ICT in their lessons. One teacher revealed that he integrates ICT in his teaching by showing students videos to help them have a better understanding of the lesson. According to the teacher, the students are always excited and react positively when he uses ICT in his lessons. For instance, a teacher in Benso SHS, indicated that *"When I used my own laptop for a demonstration by showing 1 or 2 videos on the lesson, they got so happy. I remember one time I was teaching a topic around radioactivity. So, I showed them how full radiations are being done and they were very happy to see it. Now, the students encourage me to always bring the laptop to class".*

According to another teacher from Ziavi Community SHTS, an example of how she integrated ICT in her English class was by downloading a movie which she previewed with her students. She explained that due to the many characters in the literature book, she introduced the movie to help the students grasp the story line before reading the book. Below are some verbatims from interviews on how teachers demonstrate the use of digital technologies:

- *"I remember that the SETP programme trained us on ICT; how to incorporate ICT in our teaching. So, personally, I started integrating ICT in my teaching by using my own laptop. In chemistry, we have some topics that are very abstract. There are some abstract things which you can never see so you have to conceptualize it form the ideas before you begin to get it. So, when they use the ICT, we train them on how to bring some abstract things to real-life. We show them objects, real demonstrations for them to understand it. So, incorporation of ICT to learning had really helped us".*
- *"... The only digital resource we have in the school is laptops. We use laptops sometimes to conduct some research on the topics to be taught. So, I just go to the internet and download some of the materials and give it to the students to learn. Apart from the laptop, there is no other digital tool".*
- *"I use my personal laptop to assist in teaching and learning… The school does not have a projector because I think its spoilt. So, we're only having a television which we use to play videos on various topics".*
- *"The school was provided with laptops which is available for all teachers to use, but I have my personal one, so, I don't use it".*
- *"I made my students watch a movie on one of our set books for literature before reading the book. Now, I going to use the audio version of the Shakespeare book for my third-year students. They are just three (3) in the class. So, if they want to do role play and take on different characters as we do, some will have to read for 3 different characters. So, I have downloaded the audio. And then when we go to class, I will play the audio, whiles we look on and just follow with the reading. That is what I am planning to do next".*
- *"Yes, the school has [provided us with laptops]. I told you earlier on that the school had provided a laboratory for teachers so that we can use for teaching and learning which we do. Apart from that, there were certain tablets that were provided earlier, that are with the ICT department that we can assess to for those who need them. Because we are using the computers for our teaching and learning. So, we have facility like that".*

Students' triangulation on teachers' use of digital technology in SETP schools

Insight from students' FGD indicated that some SETP teachers use digital technology in their teaching such as showing videos on various topics to facilitate teaching and learning. According to one of the students during FGD, *"In one of our chemistry class, the topic we treated was nuclear reaction but when he was teaching, we weren't understanding it so, he gathered some information and showed us videos of how the reaction between the atoms take place. So, he used videos from the internet on his laptop to teach us".* Another student revealed that some of their teachers make use of practical demonstrations which helps them to understand lessons more effectively. According to the student, *"… before we come to class, the Maths teacher will let us know what he is going to teach, and he will ask us to bring objects that has the shape of what you are going to do on that particular day. So, before you get in, you need to get all those things first and when you get there and the teacher is demonstrating, then you will also be doing it. That makes you enjoy the subject and not run away from it. Because we all don't like math but because we will see the demonstration on the television and you bringing something makes one to like it more.*

While some SETP students revealed that the availability of a computer lab has been helpful, others revealed that their school lack adequate digital resources such as laptop computers, projectors, and access to internet. One of the students revealed that even though some of the teachers seem willing to use digital technology to teach, the school is challenged with a lack of digital resources. Here is a quote, *"…we lack adequate computers. We have the teachers who are willing to teach but the things [resources] are not there.*

Below are some more quotes from students on challenges in the use of digital technologies

- *"For the infrastructure, we still lack desks and some equipment in the lab especially the ICT lab, we do not have a single computer there. So, if the management can help us by providing some computers in the lab. I think those will improve our studies".*
- *"We have a computer room but not a lab. We lack computers and we don't have internet access".*
- *"Please, I want to add to what he said. With the ICT laboratory we have it, but we don't have what we need, like the computers and laptops that we expect to go to the lab to see. Because we suffered when we were in form one and two and those coming too are suffering".*

Insight on teachers' challenges in demonstrating the use of digital technology

With about 1 out 10 SETP teachers demonstrating the use of digital technology, qualitative insights were sought to unearth the challenges teachers face in demonstrating the use of digital technologies. Some teachers revealed that they are challenged by the schools' lack of digital resources such as laptops and projectors. One teacher revealed although he uses his mobile phone for personal research, he does not have access to a laptop, so, he is unable to show videos or make digital illustrations to students to appreciate what is being taught. According to another teacher, the main challenge is charging the laptop in the classroom because there are no power sockets. So, by the time he wants to make an illustration, the laptop's battery would have run down. The teacher implied that lack of power sockets in the classroom is to deter students from using mobile phones in school. The qualitative survey also deduced that some teachers are not familiar with the integration of digital resources in their lesson. This challenge was determined when one teacher indicated that even though the school has an ICT laboratory, he needs the assistance of the school's ICT coordinator in order to make use of any digital resources. Another teacher also stated that *"…my challenge on the use of the laptop is that I struggle to identify certain letters and symbols on the keyboard, so I usually request for assistance from the ICT personnel".* These challenges point to the assumption that some teachers have inadequate skills and knowledge on how to use digital resources to support learning in the classroom. Another teacher revealed that teachers who are not ICT inclined usually encounter challenges when integrating digital technology in their lesson. During in-depth interview with the teacher, he indicated that, *"Definitely some of us do [have challenges] because once you are not all that good in ICT, you have to call for assistance. So… projecting, connecting the projector and then giving the lesson in a presentation form is a challenge".*

Another teacher revealed that demonstrating the use of digital technologies is a challenge due to time limitation and lack of students' familiarity with the use of the computer to perform simple actions.

According to the teacher, *"…the use of digital technology is helpful, but the problem is time is not always on our side. Most of the students are not conversant with the use of the computer. So, when you get to the ICT lab, apart from you using the master computer to display, if there are things they must do, say, they are supposed to type out something, let's just say cube. Even the movement of the mouse to control the cursor on the screen is always a problem for them. So, you, the teacher, must go round and let them use the line to construct a cube. So, the problem I face is using the mouse to control the cursor to get the line-up is the problem. But with time they will catch up. But I tell them those who have computers at home, they should tell their parents to let them have access to them. Most of their programs should be academic-based programs and not any other thing so that it will guide them when they come back so that your teaching will be much easier for them to understand".*

3.8.5 Teachers in SETP schools demonstrating GESI-responsive pedagogies.

3.8.5.1 Percentage of teachers demonstrating GESI-responsive pedagogies

This indicator tracks teachers' demonstration of gender-responsive pedagogy using the criteria shown in box 3.3[15].

Table 3.53 presents the proportion of teachers who demonstrated GESI-responsive pedagogies in their lessons. Based on the results, about 16 percent of the teachers met the minimum criteria for the indicator. This shows a significant increase given that none of the teachers met the criteria at baseline.

The results also shows that teachers in category A and B schools fared better than teachers in category C schools. At the school level (See table A2.17 in annex 2), Benso SHTS and Bolgatanga SHS had the highest proportion of teachers (37.5 percent) satisfying the criteria of the indicator. None of the teachers in Bosome SHS, Zabzugu SHS and Ziavi Community SHTS met the indicator criteria.

Box 3.3 GESI-responsive instructional strategies

- The teacher applies all teaching methods equally to male and female students
- The teacher uses gender-responsive strategies to challenge gender roles and norms
- Creates a safe, encouraging learning environment
- Pays attention to all students, especially girls and students with special educational needs (SEN), ensuring their progress.
- Employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes.
- Understands how children develop and learn in diverse contexts and applies this in their teaching
- Identifies and remediates students' difficulties or misconceptions, referring students whose needs lie outside the competency of the teacher
- Teacher uses age and grade(s) appropriate strategies to enact in the lesson

Table 3.53 Proportion of SETP teachers demonstrating GESI-responsive pedagogy, by year (%)

	2022	2023
Sex of teacher		
Male	0	15.8*
Female	0	17.1*
School category		
Category A	0	37.5*
Category B	0	37.5*
Category C	0	11.5*
School sex		
Mixed-sex	0	26.7*
Single-sex	0	15.2*
Overall	0	16.1*
Total (N)	179	180

[15] In computing the indicator, three methods were employed to provide a composite score: lesson observation, a follow-up interview with teachers, and a self-administered questionnaires with students. The computational procedure is similar to the process used for the NTS. As a recap, after the three tools are averaged to provide a mean composite score, a teacher is expected to obtain a minimum of 75 percent on the mean composite score to satisfy the criteria of the indicator.

Table 3.54 presents the progress made by SETP teachers in demonstrating GESI in their lessons, comparing data from 2022 to 2023.

In 2022, no SETP teachers achieved an excellent demonstration of GESI. However, in 2023, the percentage of teachers who demonstrated GESI excellently increased to 16.1 percent.

For good demonstration, only 7.3 percent of SETP teachers met the criteria in 2022. However, this percentage increased significantly to 50.0 percent in 2023, indicating substantial improvement.

In terms of fair demonstration, the majority of teachers, 58.6 percent, met the minimum criteria in 2022. However, in 2023, this percentage decreased to 33.9 percent, suggesting a notable shift in the approach of SETP teachers towards GESI in their lessons. It indicates that more teachers are transitioning from a fair demonstration to either an excellent or good demonstration of GESI in their lessons. This implies an improvement in their understanding and implementation of GESI within the classroom, potentially leading to a more inclusive and equitable learning environment for all students.

The poor demonstration category shows the proportion of SETP teachers who failed to demonstrate GESI in their lesson. In 2022, 34.1 poorly demonstrated GESI in their lesson. However, in 2023, there was a notable improvement, as the percentage of teachers who poorly demonstrated GESI dropped to 0.0 percent. This indicates a positive outcome, suggesting that efforts made to enhance teachers' understanding and implementation of GESI have yielded results, leading to a more inclusive and equitable learning environment for students.

Table 3.54 – Progress in SETP teachers' demonstration of the GESI in their lessons – (%)

	2022	2023
Excellent	0.0	16.1
Good	7.3	50.0
Fair	58.6	33.9
Poor	34.1	0.0

Table 3.55 also details the proportion of teachers who met the criteria for the teacher competency scores. As shown in the table, there was a significant increment for "creates a safe, encouraging learning environment" by 22 percentage points (detailed explanation has been provided in section 3.8.3). Reports from lesson observers indicated that most of the teachers created an environment that made students feel welcomed to contribute during lessons. Equal treatment of male and female students also saw a significant increment from 14.5 percent at in 2022 to 37.8 percent in 2023. The competencies which did not witness significant changes were "employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes" and "pays attention to all students, especially girls and students with SEN, ensuring their progress."

Table 3.55 Teacher competency scores on GESI-responsive pedagogies, by year (%)

	2022	2023
Creates a safe, encouraging learning environment	34.1	56.1*
Understands how children develop and learn in diverse contexts and applies this in their teaching	15.1	23.3*
The teacher applies all teaching methods equally to female and male students.	14.5	37.8*
Teacher uses age and grade(s) appropriate strategies to enact in the lesson	10.1	16.1
Employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes.	2.8	2.8
Identifies and remediates learners' difficulties or misconceptions, referring learners whose needs lie outside the competency of the teacher	2.8	10.0*
Pays attention to all students, especially girls and students with special educational needs (SEN), ensuring their progress.	2.2	2.8
The teacher uses gender responsive strategies to challenge gender roles and gender norms.	0.0	9.4*

*p≤0.05

Multiple regression analysis was conducted to determine the relationship between the demographic characteristics and the GESI scores obtained by teachers. Based on the output results in table 3.56, teachers in category C schools obtained significantly lower scores by 1.7 percentage points compared with teachers in category A schools.

Table 3.56 Output of multiple linear regression of GESI scores

Category	Coeff (*Sig)	CI
Sex		
Male	Reference	
Female	-0.144	-1.152, 0.864
Years of teaching		
Less than 5 years	Reference	
5 to 10 years	0.808	-0.422, 2.037
More than 10 years	0.376	-0.915, 1.668
School category		
Category A	Reference	
Category B	-.000	-1.451, 1.449
Category C	-1.79*	-3.000, -0.583
School sex		
Single-sex	Reference	
Mixed-sex	-1.173	-2.467, 0.120

3.8.5.2 Insights from SETP teachers' on how they are demonstrating GESI-responsive pedagogies

Case study 1

The first insight is about a teacher from Zabzugu SHS who demonstrates GESI-responsive pedagogies in his lesson delivery. According to the teacher, after attending PLC sessions, he has learnt to include both genders during groupings as well as paying attention to persons with disability (PWDs). The teacher indicated that he usually assigns some of the leading students to act as group leaders. The teacher added that he allows the students with disability to sit in front to ensure that they see and hear everything being taught or demonstrated. Below is a quote from the teacher:

"Gender equality and social inclusion means that, you should include both male and female students plus people with disability in your teaching. You don't have to be biased among them. In my teaching, we normally do collaborative work. You group the students and before you give them assignments, project work, we group them for practical work. So, when I am doing the groupings, I make sure that I include both sexes; male, female, to participate. And mostly, what I do is choose the leading students in the class for each group so that at least they will serve as a guide. I have about 4 students with special needs. I make sure they always sit in front to allow them to see and view practical clearly. In one of our night extra classes, I realized that one of the girls who was sitting at the back couldn't see me writing or couldn't see the writings on the board. So, later, I had to move the girl to the front seat and then she was now writing well. But what she wrote earlier had some mistakes because she couldn't see the letters very well. When the girl moved to the front, she was able to see the letters clearly. So, I think there was a change of writing, and she was able to do the writing".

Case study 2

Another teacher described how he personally guides a PWD to write properly. The teacher revealed that he strives to give her special attention and interact with her to make sure that she is fine. Below is a quote:

I integrate GESI into my lesson because I know some students have physical disabilities. There was one girl in catering… and how to even write properly was a challenge, so mostly, even though she is part of the class, I separate her as an individual and interact with her. I will tell her that I am giving her a special assignment and so I will write it in her book for her to do. Even I think she has a mental challenge, or probably has sickle cell and so her ability to handle pen and write is not easy. Even when we do one activity repeatedly, she will do it to her satisfaction.

Case study 3

Another teacher described how she places emphasis on social inclusion when teaching. The teacher explained that even though an aspect of GESI focuses on gender equality, she places emphasis on the social inclusion aspect of the pedagogy when teaching the home economics class since the class is full of girls. The teacher indicated that she tries to give the girls special attention in an attempt to make them participate fully in practical and group exercises. According to the teacher, there was a girl who could not participate in any of the exercises but after giving her much attention, she realised that the girl had lost her mother and was left all alone to fend for herself.

I teach the home economics class which is only females. But I know GESI is not only about male and female but also social inclusion. So, I integrate GESI in my lessons by putting much emphasis on social inclusion when I go to the home economics class. Because sometimes, for their basic needs, they become a little imparting themselves on others in terms of the things that they are not getting. So, what I do is, I give them special attention. There was a time that a student did not belong to any group. So, when I gave them the exercise, she was just sitting down. So, after I approached her, and she informed me that she couldn't understand anything because her mother had just died and that she has not eaten. So, I decided to talk to her more after the lesson and I later got to know that since her mother died, she only eats as and when her sponsor comes around. So, now during lessons, I try to give her special attention to ensure that she is not left behind".

Case study 4

Another teacher recounted how demonstrating GESI-responsive pedagogies have improved students' performance and behaviour. The teacher revealed that she applies GESI by evening grouping the class and ensuring that both genders and persons with different strengths and abilities have been mixed together. The teacher indicated that doing this has instilled leadership skills in the students. She explained that she

came to class late after attending a meeting. To her surprise, she saw one of the students standing in front of the classroom teaching her colleagues. Below is a quote from the teacher during in-depth interview:

"…Madam, as an English teacher, I lead the students to have discussions and group work. So, I will just give them a group exercise work on it after which one of the members of the group will be called to do the presentation. So, with this, the students learn leadership skills and there is also collaboration. As they work together, and critical thinking because there are some topics that the students will have to think so that they get answers for the work that they have been given. It has also built their confidence level as they as they are able to speak English better. I have noticed some changes in the students. Firstly, the confidence level of the students have been built. Madam, that is what I have noticed. There was a time that I went to the class after having a meeting [with the school leadership]. But when I got to the class, I saw one of the students standing in front of the class teaching. At first, they weren't doing that. So, I've realized that giving them group assignments and exercises where one of the students must come forward and present has really been good for them. They can speak English now. Previously, when you even call them, they would be running away from you because you will force them to speak English. But now, when they meet you, they start speaking English".

3.8.5.3 Qualitative findings on teachers' demonstrating GESI-responsive pedagogies

Qualitative insight was obtained from the teachers on how they understand and demonstrate GESI-responsive pedagogy in their lessons. The teachers were first asked to explain what GESI-responsiveness means. Few teachers were able to define GESI-responsiveness. Most teachers in their explanation of the term, GESI, tend to focus more on giving equal attention to both girls and boys (i.e., gender equality). Only a few were able to include issues of social inclusion in their definition. In terms of how teachers apply GESI-responsive pedagogies, some teachers revealed that they make sure that both genders are involved in discussing the lesson and giving special attention to students with special education needs.

- *"I know GESI to be Gender Equality and Social Inclusion and it is a situation whereby you consider the males and females, and you give equal rights and opportunities to all genders in a class to perform a task".*
- *"GESI is about involving both boys and girls in every activity that we do in the classroom, that is gender equality. In whatever that we are doing, whether lesson discussion or practical work, we shouldn't neglect boys or girls, but we should ensure gender equality so that every gender would be part of it".*
- *"…During our chemistry practical, we have 16 setups in our lab, so, each table takes 4 students. So, what I do is, I make sure that on every table, we have 2 girls and 2 boys there. And then I mix the weak ones with the stronger ones, so, that in case there is any difficulty, they will help themselves. It also encourages socialization".*
- *"First of all, GESI is not only about gender it is about including everybody in your class irrespective of their social background. So, when I take into consideration gender, I put them into mixed-gender groups, that is one and then in the mixed gender groups I have mixed ability groups as well. So, the group will be made up of people of mixed gender and then people with different IQs from different backgrounds".*
- *"Unfortunately, for the form 3's, there is only 1 female in the class among about 32 boys. So, I try to ask her a lot of questions because the only thing that will help her is to answer some questions for me to know that she is also following whatever that is going on.*
- *"You know, the classroom is normally swept by the girls. So, after going through GESI training, I went to a class to try and demonstrate it. When I got there, they have made a roaster on the board*

for only girls to be responsible for sweeping and cleaning the classroom. Immediately, I instructed them to change that roaster and include the boys".

- *"My understanding of GESI is ensuring gender equality during teaching where both boys and girls are treated equally and are included in every activity".*
- *This is how I demonstrate GESI... So, when I give them presentation, I put them in groups of 5 or 4. Then, I make sure that in every group, there is a girl or a boy in the group so that there will be gender equality.*

Challenges in demonstrating GESI responsive pedagogies

With regards to the challenges facing teachers in implementing GESI-responsive pedagogy, some teachers revealed that students are always reluctant to join their peers of the opposite sex when directed to form groups. This was reiterated by another teacher who claimed that some of the students do not cooperate for no reason. He stated that *"…sometimes, when you are grouping them, some students would not like to join the other opposite sex for reasons best known to them".* Another teacher indicated that in mixing students of the opposite sex, some of them get sexually attracted to one another and thereby lose focus of what it's being taught. Another teacher also indicated that he is challenged in implementing GESI pedagogy by the unavailability and difficulty in accessing appropriate resources needed in preparing lessons that best suits a class with diversity. Another teacher affirmed this by indicating that, *"…even getting the needed teaching and learning resources is a challenge because preparing a lesson to cater for every learner in the classroom takes a lot so sometimes getting the teaching and learning resources can be challenging".*

A teacher suggested that some of his colleague teachers are struggling with the demonstration of GESI responsive pedagogy because do not pay much attention to students in terms of their diversity hence during lesson preparation, they fail to design and deliver a lesson plan that addresses the need of every student. Another teacher who admitted to facing challenges in demonstrating GESI responsive pedagogies stated that, *"…sometimes, applying GESI is not easy. The challenge is from the students who come from a certain background where they don't see the need for gender equality. Yes, sometimes it is quite difficult to handle them. For example, when you put a boy who feels that a man is superior to a woman in a group, sometimes he wants to do everything. He doesn't want other females to partake in the activity, so these are some of the challenges I face".* Another teacher reiterated this challenge by revealing that he is hindered in applying GESI due to misconceptions from students. According to the teacher, *"…if you tell the students that boys and girls are equal in terms of their learning, they tend to misunderstand you… Sometimes, the boys think that the girls cannot do well in certain subjects or certain topics. So, when you try to put them in groups, some boys don't want to belong to certain mixed groups. So, misconception is a problem.*

3.9 School-level findings

3.9.1 Boards and senior management teams of SETP schools that demonstrate understanding of their roles and responsibilities

Interviews were conducted with members of school boards, heads of schools, and senior management staff. The data from the interviews were triangulated to establish commonality and scoring. Box 3.4 presents the criteria for measuring the leadership and management skills of school leaders in SETP schools.

The 2023 results show significant improvement from boards and senior management. The 2023 results increased from 8.3 percent in 2022 to 66.7 percent. This implies that 8 out of the 12 SETP school leaders were excellently demonstrating an understanding of their roles and responsibilities in 2023 compared with 1 out of 12 in 2022.

Box 3.4 Criteria for measuring roles and responsibilities

- Developing and implementing vision and mission statements
- Developing and implementing school improvement plans
- Developing strategies to support professional development and teaching practices
- Developing strategies to support improvements in students' achievement
- Establishing and capitalizing on linkages with industry and tertiary institutions.

Table 3.57 Competency scores for boards and senior management (%)

Competencies evaluated	Survey 2022	Survey 2023
School mission statement is shown and aligns with GES	66.7	100.0
School vision statement is shown and aligns with GES	41.7	100.0
School has a school improvement plan (SIP) or a school partnership performance plan (SPPP) and has been shared	25.0	91.7
Ensuring the availability for students of (a) career guidance; (b) psychosocial and emotional counselling services; (c) academic counselling; and, (d) a link with industry and tertiary institutions	16.7	83.3
Have a GESI targets in the school's SIP/SPPP	16.7	50.0
Have teaching and learning targets in your SIP/SPPP	16.7	58.3
Have in your SIP/SPPP leadership and management focused targets or school has leadership and management focused targets	8.3	58.3
Have any institutional partnership/community engagement targets in your SIP/SPPP or as a school	8.3	58.3
Have student engagement/performance targets in your SIP/SPPP or as a school?	8.3	58.3
Have developed strategies to support the professional development of teachers	0.0	100.0
Have developed strategies to support improvements in student performance	0.0	100.0

3.9.1.1 Qualitative insight from school leaders

Qualitative interviews were conducted with school leaders to provide insight into how school leaders are demonstrating their leadership and management skills. In particular, the interviews focus on how the school leaders are improving teaching and learning, student performance and staff development.

One of the key functions mentioned by the school leaders is “Lead the academic activities of the school”. The main objective of this function is to improve academic performance and students and effective teaching by teachers. The school leaders explained the varying ways they execute this function. Some of the ways cited include, providing general supervision of teachers during lesson delivery and extra-curricular activities. They also assign roles to teachers and supervise to ensure that the roles assigned are executed. Some schools such as E.P. Agriculture SHS, Tatale also mentioned that they convene regular academic board meetings on progress of students and also check attendance of staff daily.

School leaders of Nabango SHTS, Ogyeedom Community SHTS and Bolgatanga SHS also mentioned that they ensure teaching and learning resources are sufficiently available to both students and teachers. They also cited that they run the school to ensure the new mission and visions developed for the schools are achieved. Other activities the school leaders carry out to “lead the academic activities of the school” include consult with school board to solicit ideas about academic activities, monitors academic progress of students and ensure academic calendar and timetable are prepared and followed through

Another key role mentioned by the school leaders is “Guidance/leadership of the staff”. The school leaders explained that they execute this role by collaborating with other school leaders and boards to solicit for ideas to ensure the school’s progress. They school also mentioned that they engage in conflict resolution practices to ensure cordial relations among teachers, staff and students. Heads of Bolgatanga SHS and Lambussie Community Day SHS also mentioned that they provide counselling services to especially teachers on their academic development as well as their career development. Another important function which was stated by the majority of the school leaders was exalting and motivating teachers during staff meetings for good jobs done. Some school leaders from Gambaga Girls SHS indicated that they had developed spreadsheets to be completed by teachers weekly to track their progress.

With regards to “Report on the performance and progress of the school to the school board”. The school leaders mentioned that the head of school provides updates on progress of the school during board meetings. Some school heads also mentioned that as and when applicable, situational reports and status reports are shared regularly with the board even before scheduled dates for board meetings. This ensures prompt deliberation and resolution to issues that are urgent.

3.9.1.2 Qualitative insight from school boards

Insight from qualitative interviews with members of the school board revealed that school board members are quite familiar with their roles and responsibilities. According to a school board chairperson, school boards are responsible for ensuring that the school adheres to the policies of GES and ensuring that school management activities are effectively supervised and monitored. According to a board member, the school board is always monitoring school management to ensure that teachers are supervised to deliver. Another board member indicated that his role is to ensure a continual learning environment in the school by maintaining discipline among teachers and students and providing the necessary teaching and learning materials. Insights from boards revealed that members of the board perceive that they are responsible for the smooth administration of the school and provide assistance to resolving challenges facing the school.

Below are some quotes from school board members:

- *“My role as a [board] chairperson is to ensure that the school adhere to the policies of GES and the school uses the policy so that they will abide by the rules and regulations of GES by rallying my board members behind me to ensure that effective monitoring and supervision go on in the school”.*
- *“We are more particular with academic performance. So, from time to time, we are on the neck of the school management to see to it that they do effective supervision to ensure that the teachers deliver. And they also ensure very continual learning environment in the school by providing the necessary teaching and learning materials, by effecting discipline among teachers and students. And by, falling on stakeholders to offer assistance to the school. And some of them, we even lead*

some of these interventions. So that the school will be adequately equipped to deliver the mandate that they have been given".

- *My role as a board chair is to help the school administration to run smoothly with the help of the headmaster, assistant head and other board members. I help them if there are any lapses in the administration of the school, or if there is difficulty on the part of teachers here and there, I come in and help. At times, If parents are not forthcoming with activities, I get the PTA chairman and we link up. We have to link up with the PTA for the smooth running of the school.*
- *"The role of the board chair or member is to regularly visit the school, engage with the management and teachers, and help identify any challenges that they may be facing. In doing so, the board can work with the school leaders to find solutions to problems".*
- *"My role as a board chair is to manage the school very well. I also collaborate with parents to explore opportunities for resource mobilization that can benefit the school".*

Challenges SETP school boards are facing

According to school boards, their main challenge is the long distance between their location and the school. Thus, even though they desire to visit the school more often, the distance involved is discouraging. Also, the schools do not have a school a school bus to help ease movement. Another challenge is the limited funds available for the school to operate with. According to school boards, it is difficult to plan programs without sufficient funds, and they must chase stakeholders to secure funding. Another board member revealed that the school is challenged with low enrollment due to low patronage and bad road access to the school. Another board member complained about the poor state of the headteacher's house, office, and school administration block. According to the board member, "*We are facing many challenges. Where the headmaster lives, and his office is in a poor state. The administration block is also in a poor state. We lack a school bus, so, if staff and students are going anywhere, they don't have a bus to use so they have to use 'trotro' or they have to hire one. The school also needs a computer lab. They have to get one so that we can also help them by providing some computers gradually".*

According to a few school board members, they support their school to ensure an inclusive gender responsive environment for students. For instance, a board member indicated that they participated in a workshop with officials from GES and they were informed of ensuring gender sensitivity in the school environment. Afterwards, members of the board met with parents and students separately to discuss issues of gender sensitivity. According to the board member, some female students claimed that when girls complete SHS, their parents usually do not provide support for their continued education. The board collaborated with the community leaders to organise a durbar where parents were advised on the importance of supporting their female children through their academic journey to the tertiary level. According to the board member, the paramount chief encourages parents and community members to support teachers and students in the community to ensure an improved relationship between the community and staff. According to another board member, they ensure an inclusive gender responsive environment by encouraging students to do more physical activities like sports, and group reading. The board member indicated that *"I think that it is good for both boys and girls to read together because it will encourage the female and male students to know that we are all the same. I think reading together helps very well because after reading they will ask themselves questions".*

3.9.2 SETP schools with an inclusive, gender-sensitive environment for staff and students

This section measures the extent to which SETP schools provide an inclusive gender-sensitive environment for staff and students. In reporting the results for this section, responses from school leaders (including a review of documentation) were triangulated with data from lesson observations of teachers and student self-assessment questionnaires. For a school to be considered as having an inclusive, gender-sensitive environment for staff and students, the school must score a minimum of 60 percent when the responses from the school leader are triangulated with the teachers and students.

The 2023 results show significant improvement in schools with an inclusive, gender-sensitive environment for staff and students. As seen in table A2.19 in annex 2, 7 out of the 12 SETP schools were ensuring an inclusive, gender-sensitive environment for their staff and students in 2023, an increase from 2 out of 12 schools in 2022

The results in table 3.58 detail the performance of schools in different aspects of the GESI criteria. The results show improvement across all the competency areas, with over half of the schools demonstrating these competencies.

Box 3.5 Criteria for measuring inclusive, gender-sensitive environment

- Dedicated spaces/admission for students from disadvantaged backgrounds
- Transparent reporting system for harassment
- Recourse and reprimand for harassment
- Procedure in place to provide an inclusive and gender-sensitive environment for staff and students
- Health and safety procedures in place for staff and students
- Gender-responsive infrastructure like washrooms and changing rooms
- Infrastructure in the school accessible to all students (including those with special education needs i.e. SENs)

Table 3.58 Schools that satisfy inclusive, gender-sensitive environment criteria (%)

Competencies	Survey 2022	Survey 2023
Health and safety procedures in place for staff and students,	58.3	66.7
Gender-responsive infrastructure like washrooms and changing rooms etc.	58.3	66.7
A transparent reporting system for harassment	58.3	75
Recourse and reprimand for harassment	41.7	66.7
Infrastructure in the school accessible to all students (including those with special education needs)	50.0	58.3
Dedicated spaces/admission for students from disadvantaged backgrounds	41.7	66.7
Procedure in place to provide an inclusive and gender-sensitive environment for staff and students	33.3	58.3

One of the key criteria for ensuring an inclusive, gender-sensitive environment is “health and safety procedures in place for staff and students”. To satisfy the criteria for this indicator, it is expected that the schools have sick bays available as well as adequate changing rooms for female students. It is also important that the schools provide enough washrooms at the dormitories and near the classrooms. During the interview with the headteachers, they indicated that the schools have washrooms and changing rooms. However, upon verification, enumerators were able to confirm that schools such as Bosome SHS, Zabzugu SHS, Nabango SHTS and E.P. Agriculture SHS had facilities to attend to students who are sick.

Enumerators confirmed that across the SETP schools, separate washrooms were available for both male and female students. However, concerns were noted in a few of the schools concerning the hygienic nature of the washrooms. Most of the schools did not have changing rooms near the classrooms. Female students rather use the washrooms as their changing rooms. Particularly i Walewale Vocational Technical Institute,

the school had limited dustbins available as well as an insufficient number of washrooms. Some students confirmed that they practice open defecation due to insufficient washrooms and water challenges.

Sexual harassment prevention is one of the most important criteria in ensuring a gender-sensitive environment for staff and students. To confirm the information provided by heads of the schools, the students were also interviewed to validate the responses. All the SETP schools confirmed that they have a sexual harassment policy in place and students are oriented in their first years with further reminders subsequently by the school authorities. According to the school leaders, students are taken through avenues to protect themselves and also guided on the reporting channels.

In most of the schools, the guidance and counselling office has been dedicated to reporting issues of sexual harassment. Some schools, such as Benso SHTS specified that a suggestion box had been placed at a vantage point in addition to the counselling office to enable students to report all complaints including harassment, anonymously. Further, in most of the schools, the house masters and mistresses are assigned as dedicated officers to whom issues are reported.

The standard protocol for addressing harassment issues, according to the schools, is that the suspect would be arraigned before a disciplinary committee to address the complaints and recommend sanctions are made. In matters of rape, the schools confirmed that the complaint is reported straight to the police to investigate and prosecute. At the time of data collection, schools such as Benso SHTS, Nabango SHTS confirmed that no alleged issues of harassment have been reported thus far. Bolgatanga SHS confirmed that as at the time of the interview, two students who misconducted themselves were punished by the school for engaging in sexual activities.

Interviews with students revealed that about 14 percent of the students confirmed that they had been victims of gender-based violence. A similar proportion was noticed among male (14.4 percent) and female (15.1 percent) students. According to these students, the majority of the harassment was from other students in the school.

About half of the male and female students confirmed that they are aware of channels in place to report issues of harassment. This finding suggests that the school authority has to do more to reorient students on the reporting channels in the school. A similar proportion also indicated that they are aware of dedicated officers to whom issues of harassment can be reported. Interestingly, about 4 out of 10 students have heard about actions being taken against someone who abused a student in the school. About 73 percent of the students indicated that they are satisfied with their school's response in dealing with sexual harassment and gender-based violence.

Table 3.59 Percentage of SETP students who agree with GESI statements

Students' GESI criteria	2022	2023
Heard of actions being taken against someone who abused a student in your school	30.5	43.7
Aware of any channels in place to report sexual harassment and gender-based violence in the school	30.3	51.1
Aware of the existence of dedicated officers assigned to oversee reports on sexual harassment and gender-based violence in the school	28.2	53.4
Course structure promotes GESI	17.9	34.5
Classroom practice is GESI responsive	17.9	34.5
Teaching and learning materials (e.g., blackboard writing and drawing charts, posters, maps, diagrams, graphs, photographs) are GESI responsive	5.1	15.5
Infrastructure in the school is accessible to all students (including those with special education needs)	4.5	42.6

Table 3.60 Percentage of teachers who satisfy inclusive, gender-sensitive environment criteria based on lesson observation

Teachers' GESI criteria	Survey 2022	Survey 2023
Creates a safe, encouraging learning environment	34.1	56.1*
The teachers apply all teaching methods equally to female and male students.	15.1	37.8*
Understands how children develop and learn in diverse contexts and applies this in their teaching	14.5	23.3*
Teacher's use of age and grade(s) appropriate strategies to enact in the lesson	10.1	16.1
Identifies and remediates students' difficulties or misconceptions, referring students whose needs lie outside the competency of the teacher	2.8	10.0*
The teacher uses gender responsive strategies to challenge gender roles and gender norms.	2.8	9.4*
Pays attention to all students, especially girls and students with special educational needs, ensuring their progress.	2.2	2.8
Employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes.	0.0	2.8

3.9.3 Secondary education institutions providing services for their students

This section of the report measures the percentage of SETP schools providing various services to students (see box 3.6). Heads of schools completed a questionnaire asking them whether their schools have full- or part-time counsellors (or counsellors that combine their counseling responsibilities with a full teaching workload) that routinely and regularly provide one-on-one:

(a) Career guidance, which is provided to students to help them acquire the knowledge, information, skills, and experience necessary to identify career options and narrow them to make a career decision;

(b) Psychosocial and emotional counseling services that support the process of overcoming environmental, emotional, or social concerns; and,

Box 3.6 Criteria for measuring SETP schools provision of services

- SETP schools providing career guidance, psychosocial and emotional support, and academic counseling to students
- SETP schools with trained and dedicated officers to provide counseling support services to students
- SETP schools provide evidence of links with industries

(c) Academic counseling, which helps students acquire and apply effective and efficient study skills with the intention of improving students' academic performance.

The results were triangulated with students[16]. A follow-up interview was conducted with school heads to verify the availability of the services at the schools. Heads of schools were also asked about the number of formal and active linkages with industry and tertiary institutions.

From table 3.58 below, there has been improvement in the proportion of schools providing services to students

Table 3.61 Percentage of SETP schools providing services to their students (%)

	Survey 2022	Survey 2023
SETP schools providing career guidance	50.0	66.7
SETP schools providing psycho-social and emotional counselling services	8.3	58.3
SETP schools providing academic counselling	66.7	75.0
SETP schools with link with industry and tertiary institutions.	0.0	33.3

How SETP school boards are supporting their schools to improve partnerships with tertiary institutions, employers, and the community.

The school authorities have been collaborating with some tertiary institutions to provide support to students through mentorship and scholarship programmes. They also provide resources to the schools to support teaching and learning. The three major institutions cited by the SETP schools were the Kwame Nkrumah University of Science and Technology (KNUST), the Tamale Technical University (TTU) and also the Fosu College of education (CoE). Specifically, Lambussie Community Day SHS, Zabzugu SHS and Benso SHTS

[16] Students were asked to agree or disagree, using a Likert scale, with the following (or similar) statements: (a) counseling services at my school are a priority in supporting (i) my educational progress and (ii) my emotional well-being and (b) the career guidance I have received at my school has helped me make a decision about what I should do with my life in terms of further education or the world of work.

stated that KNUST provides counselling and scholarship opportunities to brilliant students from their institutions. The head of Gambaga CoE also mentioned that the TTU also provides mentoring programmes and counselling to their students.

"KNUST come to talk to students on career advancement in their schools They give a quoter for students admission for deprived schools They provided Laptops to the school."

KNUST Supports brilliant but needy students in terms of scholarships packages."

With respect to collaboration with industry, Walewale Vocational Technical Institute particularly mentioned that they collaborate with artisans in the communities to provide apprenticeship training to their students especially during vacations. This enables the students develop practical experience in their chosen field. Also, the boards for Benso SHTS also stated that they provide support to the school through collaboration with stage agencies such as the district assembly, and also private organisations such as Benso Oil company and Golden Star resources ltd.

According to a board chair for Benso SHS, he led the school to enter into an agreement with the management of Benso Oil Palm Plantation to help keep the school environment from its bushy nature in order to promote the safety of students and staff of the school. So, an agreement was reached, and parts of the school land has been leased to the Oil Palm Plantation company to use for their oil palm plantation activities in an attempt to prevent the surroundings of the school from being dangerously bushy. Below is a direct quote from the school board chairman at Benso:

"…Those days, the school compound was so bushy, in the days when we were first inaugurated and started work, the place was bushy. So, I had a meeting with the personnel manager of Benso Oil Plantation Company and asked them what they could do to support the school. And they in turn told me that they have even thought of the school that, they intend coming to the school to agree on some partnerships so that they can develop part of the school land in oil palm plantation. So that, whenever the land is needed, they can return it to the school and that will help to clear the bushes. So, I told the headmistress in those days, and they met us, and we rented it and they started. So, an agreement was established just to make sure that the land is secured. The agreement was that a percentage of the proceeds from the Oil Palm Plantation will come to the school, a percentage goes to the community and some also goes to the company.

Another board member revealed that they have collaborated with some employers who are part of the old students' association to organise career guidance meetings with the students. According to the board member, they normally organise these career guidance meetings and educate students on what to do after completing senior high and how to get the best of courses at the tertiary level.

"We haven't done it on our own, but it has always been a collaborative effort, particularly with the old students. So, the old students, those of them that are working in other institutions, normally come once a year to organize meetings to… talking about to students on what to do after SHS, how to get the best of courses in tertiary level and giving them career guidance. I think there was one or two occasions when we organised some meetings for first-year students where we brought in other stakeholders to and entreat them on how to live their lives on this campus"

Some board members revealed that they did not know that they were supposed to support their schools to improve partnerships with tertiary schools and organizations for future. According to a board chairman, *"to be honest with you, we haven't gone into that area because I see it as the normal progression of students, and I didn't see that we needed to get partnership with identified institutions like the college of education in Gambaga to the Girls SHS.*

Another board member admitted that he will henceforth support the school with to create partnerships with tertiary institutions and employers. When asked whether the school board has provided such support, he admitted that *"I can't remember if such connection was built but now that you are bringing it to my attention,*

I will do that". Another board member interestingly remarked, *"I have a lot in mind, but I haven't pushed it yet".* The insights suggest that school boards should be given more training on how to support their schools to improve partnerships with tertiary institutions, employers, and the community.

3.10 Findings from parents and opinion leaders

3.10.1 Insights from parents

The qualitative survey sought to obtain insights from parents of students in SETP schools on how they communicate and collaborate with the schools to stay informed about their children's academic progress and well-being. Qualitative insight indicate that most parents communicate with the school during PTA meetings. During the PTA meetings, it was revealed that parents, teachers, and members of school management discuss students' performances and share ideas on the measures needed to be taken to bring about improvement.

Some parents also revealed that they make personal visits to the school to inquire about their children's performance. During such visits, they usually have one on one discussions with subject teachers especially when their children attain low scores in specific subjects. For instance, a parent of a student from Bolgatanga SHS revealed that when he receives the terminal report of his child, he visits the school to discuss the results with the subject teachers and how best the child can be supported. Other parents also indicated that when they are unable to visit the school, they make call the school to enquire about their children's performance and well-being. An example was when a parent indicated that he calls the school to enquire about his child's attendance rate when it does not meet his expectation. The results further revealed that parents communicate and stay informed about the events and developments in SETP schools through a dedicated Parents' WhatsApp platform, official letters, and radio announcements. Below are some qualitative verbatims from parents:

- *"Any good parent who is called upon to go for a PTA meeting attends… It is through PTA meetings that we the parents will be able to share our opinion because you can't be home and get your views heard."*
- *"Some parents come here to inquire of how their wards studies is going. They come here to ask the teachers here in the school. Unless you come to the school and meet the teachers and then you can share your idea and they can add it to theirs and be able use it in their dealings".*
- *"When we come for PTA meeting, we are made aware that these are the activities the students' need to do, so what can be done to support them. So, sometimes we contribute a little to support them".*
- *"When the previous headmistress was here, we didn't really have PTA meetings. But since the arrival of this new headmaster, there has been a number of PTA meetings already. One was about their kitchen, it wasn't in good shape, so they made it known to the parents. And the second one was security that the school needs. And third was the students' health needs".*

The qualitative survey also asked parents whether they have taken any initiative to support SETP schools to improve teaching and learning, school environment. The results revealed that parents have made a variety of efforts to support SETP schools towards the improvement of learning outcomes and ensure the safety and wellbeing of their children. Some of these initiatives include making donations to provide textbooks to schools, motivating teachers financially when they take students through remedial or extra classes, providing food items to schools to support boarders. The results revealed that parents came together to make financial contributions for the provision of textbooks for students whose parents cannot afford. In Benso SHS for instance, a parent remarkably revealed that they have made a series of financial contributions towards securing the services of a security personnel, the refurbishment of the school's kitchen and establishment of a health centre. According to the parent, although the establishment of the health centre is still ongoing, they have made provisions for a house to accommodate the school nurse in

the community. Another example of initiatives taken by parents in support of SETP school is the case of Bolgatanga SHS. An interview with a parent indicated that as members of the PTA, they rolled out an intervention of incorporating extra tuition into the timetable to help improve the trend of poor students' learning outcome. The parents have also made financial contributions to provide extrinsic motivation to the teachers as they take on extra classes with the students to help improve their performance. The results also indicated that parents of Bolgatanga SHS have constituted a 'General Development Levy Account' within which they make contributions for the sole purpose of supporting developmental projects of the school. Below are some qualitative verbatims from interviews:

- *"As we did it as a PTA, as a group, as parents association, we came together and the school authorities did presentation on the students' performance for the past years and we realized that ha the performance was no encouraging so we agreed that we will come out with intervention for the students in a way of extra tuition so all the parents agree that we will make a contribution so that the teachers will take the students on extra learning after class so this was one of the things that we did so that it can encourage the teachers to put up their best and to also put in extra efforts to change the performance and improve it for the better".*
- *"As parents, we made some contributions in order to get something for the teachers to appreciate and encourage them for their extra efforts to taking our children through extra classes. We also made some financial contributions that is meant for the general development of the school that we call the General Development Levy, so that development Levy is the school that will decide on what the thing is addressing needs and then parents will then come together and release funds for it to be done. So that one too is on course".*

The qualitative results also revealed that parents of students in SETP schools strongly contribute to creating a community of shared responsibility with SETP schools. According to most parents interviewed, they usually work together with the schools during PTA meetings by discussing and sharing ideas with school management on the major challenges affecting the school before making final decisions. According to a parent, the community have created a shared responsibility of supporting SETP schools by indicating that even the chiefs and opinion leaders are involved in the decision-making processes of the school because they also attend PTA meetings. Another example was cited by a parent by indicating that with access to water being a challenge for students and teachers in the school, parents collaborated with the school and procured a water storage Tank (poly tank) and have also constructed two boreholes, with one being mechanised in support of the staff and students at the school. Prior to that, when there was shortage of water in the school, the community members would offer to provide water to the students in the school to prevent the students from going out to fetch water. Qualitative insights also revealed that parents of Gambaga SHS have constructed a fence wall and a gate to help tighten the security situation of the school. This support was provided when parents during a PTA meeting complained of the high prevalence of students' indiscipline and escaping from school to loiter and roam in town without obtaining permission or exeat. The results also revealed that as PTA members, parents took it upon themselves to sensitise community members on the need to support school and providing basic necessities to the female child such as sanitary wears to help secure and promote their wellbeing. Below are some qualitative verbatims from interviews:

- *"During of the PTA meetings, we were made aware by the school leaders that the government has not provided textbooks to the school. Some of the parents bought the needed textbooks for their children and some contributions and donations were made to support needy students to also have some textbooks".*
- *"We also made some contributions for the replacement of dead bulbs in the school".*

- *"We have made contributions towards the construction of a fenced wall and a gate to beef up security because some of the students used to run away from school without an exeat".*
- *"The PTA took upon themselves the responsibility of sensitizing the community on the need to support the school to grow and also to ensure the security of the girl child. This has increased the awareness of the township to be on the look out to ensure the security of the girls".*
- *"Since we observed that some students are fond of loitering in town, some parents support the school management by inspecting students' exeat cards whenever they see students in town".*
- *"Parents ensure that their wards report to school on time and also provide them with basic needs such as pads, soaps, pomades, etc. This is important because lack of these basic needs lure some of the girls to men for money".*
- *"Another way of creating a community of shared responsibility is through durbars. During durbars, the whole community is briefed on challenges affecting the school. During the durbars, Chiefs and opinion leaders are invited and made aware of the challenges in the school and they support them with the needed support".*
- *"In cases where there is scarcity of water in the, as community members, we would offer support by providing water to students, rather than the students going out to fetch water".*

In spite of parents' commitment to supporting and collaborating with SETP schools to improve the teaching and learning environment, the qualitative survey sought to determine whether parents are hindered by challenges in their efforts to work together with the schools and support learning. Results from the qualitative survey revealed that some parents are bothered by lack of proper accountability on the resources mobilized as well as ineffective monitoring on how funds are efficiently utilized. Other parents bemoaned about the country's economic hardships and inadequate time to mobilize funds. This thereby makes it challenging to donate funds when the school is in urgent need of developmental assistance. A parent stated that in the face economic hardship in the country, the school's kitchen was raided by thieves, and took away with food items due to a lack of proper security. When presented with the issue during a PTA meeting, parents voluntarily donated food items to the school to ensure that the boarding students are well taken care of. Some parents also indicated that they are hindered by those parents who place little or no importance on the essence of education. As a result, they are not motivated nor willing to contribute or donate in support of the schools. Another challenge pointed by a parent was inadequate resources and infrastructure of the school to support effective learning. Another parent revealed that even though he has been supporting and making contributions through the PTA in support of the school, he has been forced to change his ward's science programme due to a lack of a resource centre and ICT labs. Another parent lamented on the computerised placement system admitting some students with very poor grades into the school. According to the parent, this has really posed a challenge in the academic performance of the school. However, as parents through the PTA, they initiated the extra tuition programme in the school to ensure that such students catch up.

The qualitative survey further sought to gather the notable changes taking place in SETP schools from the perspective of parents. According to parents, the academic performances of students have been good lately, an observation they attribute to improvement in teaching and learning. According to parents, students' ability to read and comprehend passages has also seen some improvement. A parent from Benso SHS revealed that the inculcation of discipline has helped reduce the rate at which students wander in town during learning hours. Another parent from Benso SHS revealed that the school compound has become neater in recent times thereby confirming the school's improvement in discipline. Another notable change according to a parent is improvement in her child's academic performance. The parent explained that since Benso SHS changed the headteacher, there has been steady improvement in students' performance and discipline. An interview with a parent from Bolgatanga SHS revealed that there has been some steady improvement in students' WASSCE results. The parent stated that, *"last year's result was an improvement*

over the previous ones. There was a slight improvement. This year's results are yet to be known so we don't know the analysis… But in 2021, there was an improvement over the 2020-year group". Another change indicated by a parent was that previously, terminal reports were given to students to submit to their parents. This resulted in some students refusing to give the reports to their parents because parents were not aware. However, there has been a notable change which was caused by the appointment of a new headteacher at Benso SHS. Thus, parents now receive terminal reports directly from the school in order to be well informed about their children's academic progress. Parents also believe that they are more involved in the management of the school especially because the school management involves them in the decision-making processes during PTA meetings on the challenges and issues bothering the learning and wellbeing of students.

Another parent who is also a PTA chairman, attributed some notable changes to the introduction of SETP. He explained that through T-TEL's intervention, professional training sessions (PLC) are organised for teachers to enhance their teaching skills and enrich their teaching methodologies. He indicated that Gambaga SHS now invites facilitators from CoEs to hold training sessions with the teachers to equip them with various methodologies to improved teaching and learning. According to the parent, *"teachers now inculcate peer to peer teaching, even to the extent of a student quizzing her fellow classmates. This enhances learning since some students understand lessons better when they are being thought by their own peers".* Below are some more quotes from parents:

- *"Discipline has improved at all levels. Teachers are now diligent and committed to their work and the students are more focused in improving their learning outcomes. Some students even have extra classes during vacation periods."*
- *"Upon the introduction of the new school head, every parent could testify that the school environment has become very neat and nice after we attended our first and second PTA meeting. Things are changing for good, so we know that there are better things also coming."*
- *"Previously, terminal reports were given to the students which some of them refused to give to their parents but now the school ensures that we the parents receive our children's report directly".*
- *"As a parent, I will say that I feel I am more involved in the management of the school. When the school is faced with any challenges, they school leaders bring them up for discussion during PTA meetings and we all talk about it and propose solutions to them."*
- *"My daughter's performance has been good lately. The last time her report came, she didn't do well so I spoke to her English teacher to help her, and I have seen that her performance has really improved in English. Her reading and understanding have improved. For maths, I have some slight improvement, but she is not there yet. I spoke to the teacher, and he told me to be patient with her and give her time".*
- *"I have seen improvement in the students' performance. My child for instance is doing better and I think it's because of the extra classes they attend".*
- *"Previously, we used to meet a lot of the students walking about in town during learning hours without any exeat. Now, you can see that there is more discipline, and this helped reduce the rate at which students loiter about in town".*

The qualitative results further revealed that staff of SETP schools are responsive and accessible when it comes to addressing parents' concerns about their children's education and wellbeing. During PTA meetings, teachers and school leaders respond to all parents' concerns and questions. The qualitative results suggest that staff of SETP schools have created an enabling environment that allow parents to inquire about their children's academic performance and wellbeing. Parents and teachers deliberate on students' performance during PTA meetings and during individual visits to the school. Particularly during

PTA meetings, challenges are identified and the best approach to resolve these issues are ironed out by parents, teachers, as well as opinion leaders. The accessibility and responsiveness of SETP schools to address parents' concerns is affirmed by parents' willingness to go the extra mile and make financial contributions towards motivating teachers for their efforts in organising extra classes for students. The accessibility of SETP schools is also characterised by the organisation of events such as Parents' Day, Speech and Prize Giving Day, and PTA meetings, all of which attempt to bring together parents and guardians to address challenges and resolve issues concerning the performance and wellbeing of students. During Parents' Day for instance, parents are allowed in some of SETP schools to monitor their wards during lesson delivery and ask questions.

3.10.2 Insights from opinion leaders

The qualitative survey sought to obtain insights from opinion leaders on the initiatives taken by the community to enhance the quality of education in SETP schools. According to opinion leaders, SETP schools have benefited from community initiatives aimed at enhancing the quality of education. An interview with an opinion leader revealed that a SETP school have had their dining hall renovated after the school consulted the traditional council of the community. According to an opinion leader, Benso SHS, for instance, have benefitted from the provision of a toilet facility and a science laboratory by Golden Star Ltd and the Benso Oil Palm Plantation, respectively, through community elders' intervention. According to another opinion leader, a SETP school receives support from religious groups through donations upon the school's request. Insight from interviews indicated that the school management or leadership present their needs to the community through the opinion leaders and contributions are made in support of the school.

Through community engagement, opinion leaders play an advisory role to some of the schools. Opinion leaders advise and encourage the school management on issues that would help develop the school. According to opinion leaders, one of the SETP schools has been supported with what is referred to as the *'Development Fund account'*. The fund has been initiated by the community to help solve the developmental needs of the community, including the school.

Insight from another opinion leader indicated that one of the SETP schools, which used to be a day school, has been converted into a boarding school with the support of the community and its traditional authority. According to the opinion leader, *"…the community, through the PTA, has taken steps in trying to regulate the movement of our students, especially in this school. As a result, the community played a key role in fighting to turn the school into a boarding school. What we observed in the past was that because the school was a day school, many times you see the students going to town during learning hours. When you confront them, you'll hear, 'I am going to buy soap' or 'I am going to buy ingredients for my food' and all of that it was eating into their time to learn. And so, my paramount chief has played a very pivotal role in trying to lobby for the school to be become boarding. By the grace of God, the school has attained a boarding status, but we still face some of the challenges regarding movement, but we are working very hard with school management to make sure that students that are accommodated in the school stay and learn".* The opinion leader added that when it comes to issues of discipline, the school consults the chief and elders of the community to solicit their opinions on how to handle any issues of misconduct, either by students or teachers.

Another opinion leader revealed that the community provides support to a SETP school by organizing inspirational and moral talk programmes through religious groups. Here, the community leader explained that some Christian religious groups in the community organises a moral lesson session to help instil good moral values into the lives of students. According to opinion leaders, some schools have been supported with digital resources. Insight from qualitative interviews revealed that the community has provided Tatale

E.P. Agricultural SHS with computers to support effective teaching and learning. Here is a quote from the opinion leader: *"There is another group both Basare and Komkomba from this community who are currently based in the United States, called the Tetirto group, who are also much concerned with the progress of the school. There were times they had to support the school with computers to aid effective teaching and learning".*

According to an opinion leader, when the school faces problems such as land litigation and encroachment, they support the school by involving the traditional leaders who are the custodians of the land to help settle the matter. The community has also supported schools with access to water in school campuses. Below are some verbatims from interviews with opinion leaders:

- *"We collaborate in terms of discipline when it comes to the students indiscipline nature we are called upon for ideas to be shared on what to do and when the school is also faced with the challenge of encroachment of their lands they call upon us, we deliberate and see how we can secure what our fore give for the development of the school and so many other areas sometimes we are called upon corrupted although we are not members of PTA but sometimes when they have PTA and there is the need for them to take certain critical decision we are consulted to seek our opinions on some of those things".*
- *"The Christian community come to give moral talks from time to time per the school's duty roaster on Fridays… they call it Morale lesson or so. Sometimes, pastors are invited to come and talk to the students".*
- *"We engage other community members and stakeholders in our community meetings. We often invite management of the school to come and talk, especially on their challenges and what they expect from us as a community to support them".*
- *"We collaborate with the school on issues of discipline. When it comes to the students' indiscipline behaviour, we are called upon for ideas to be shared on what to do and when the school is also faced with the challenge of encroachment of their lands, they call upon us. We deliberate and see how we can secure what our forefathers allocated for the development of the school*
- *"Sometimes, although we are not members of PTA, sometimes when they have PTA and there is a need for the school to take certain critical decisions, we are consulted to seek our opinions on the way forward and we support the school accordingly".*
- *"The poor road network to the school has also been a major challenge. The nature of the poor road network sometimes demotivates parents from enrolling their children in this school. But, through the traditional council and the district assembly, the road is under construction".*
- *"There was a period that there was a challenge with their water system. And these students had to walk a long distance to fetch water. During that period, their source of water was from the community because the water pumps in the school had broken down. As a community, we contributed and constructed a borehole for the school. So, that was the contribution. Secondly, I do know that some community members have also been able to lobby to provide educational materials for the community high school".*
- *"We have supported the school with sporting equipment, football, jerseys and then trophies. The school has invited me on so many occasions for motivational talks to encourage the students to actually work hard and know their objectives, and their aim of being in the school".*

In spite of the several instances where the community have collaborated to resolve challenges affecting SETP schools, some opinion leaders revealed that SETP schools are still facing challenges and are in dire need of support. According to an opinion leader the school is hindered by poor and inadequate infrastructure making it difficult for teachers to achieve excellent student performance. The opinion leader

indicated that, *"The science students have no laboratory, the home economics department is unequipped, and for the Agric department, though the school bears the name Agric, we barely have anything Agric apart from the trees planted around so, I think these are the things that when I talk about infrastructure, I think are inclusive".*

Below are some quotes from interviews:

- *"First and foremost, the school's infrastructure and the quality of students that are placed here. I can see that the teachers are doing their best but the calibre of students that are placed here, it sometimes burdens, the school to do magic for good performance to be achieved".*
- *"Inadequate infrastructure such as dormitory. Because of this, the school has been compelled to convert classrooms into boys' dormitory".*
- *"The school's kitchen facility is nothing to write home about".*
- *"The school's security is also a challenge. there was a theft case which resulted in most of the school's kitchen items being stolen".*
- *"The school lacks basic science lab equipment or apparatus, making practical science sessions difficult".*
- *"The school lacks library facility and basic amenities and financial assistance".*

A few opinion leaders revealed that they have observed some notable changes taking place in the school. One opinion leader stated that with support from T-TEL, the school has a sick bay. Another community leader revealed that he has observed that the school organizes extra classes for students in an effort to improve performance. According to another opinion leader, there has been expansion of the girls' dormitory to accommodate more females. This improvement has helped to reduce the loitering about of students, especially females. The opinion leader added that *"…the lifestyles of students, especially the female students have changed because they now stay in dormitories. Previously, most of them used to stay in town because of limited hostel facility. Cases of pregnancy in school has have reduced drastically. This is mainly due to the improvement in the school's accommodation".*

Below are some direct quotes from opinion leaders:

- *For us in this part of the country, we always believe that politicians will do magic so often time, we call the DCEs, the MPs and they will come and talk plenty, but little is done about these things. So, we are thankful to God for the secondary education program, the Secondary Education transformation program came on board at least we have seen sick bay where when students are sick, we wouldn't have to be rushing them to the hospital sometimes means of transport is a challenge, so I think that we were trusting central government to help but it is not coming but the T-TEL is doing good.*
- *"I think I do know that there was a period when they organized some extra classes for students. I think this is helping the students to improve in their learning".*

4.0 Discussion & implication of findings for policy and practice

SETP's 12 schools all shared the objective of improving the quality and management of their leadership and improving the quality and relevance of teaching and learning in these schools. SETP's ultimate goal is to ensure that all students complete their secondary education equipped with the relevant skills and competencies to progress and succeed in further studies, the world of work, and adult life.

As this report has shown, the quest to produce such students remains a work in progress, just as was expected when SETP began. There are examples of considerable improvement in student outcomes across all or most of the 12 schools, but there are also instances in which little has changed from the baseline data collection in 2022 to the endline data collection in 2023. These results are best understood when put into context.

To begin, it is essential to realise that the baseline data revealed a discouraging situation in students' proficiency in each of the four topics assessed. As found in other assessments of students' proficiency, many entering secondary school students are poorly prepared and do not yet have the essential and fundamental skills required for success in their secondary education. Their Junior High Schools have allowed them to transition to secondary education well before they are ready academically to the detriment of these students, their suitably prepared peers, their teachers, and to their secondary schools[17]. In science, for example, over 80 percent of students in 2022 were in the two lowest levels of proficiency versus about 5 percent in the two highest categories. The situation for reading, mathematics, and 21st century skills was similarly.

Smaller percentages of students were in the two lowest proficiency levels in these four subjects in 2023 – reading at 71 percent, mathematics about 68 percent, science at 59 percent, and 21st century skills at 57 percent. Among the 12 schools there were notable gains in the three category A and B schools, and often, but not always, in the nine category C schools[18]. This was not unexpected; by definition the category A and B schools were already among the best resourced schools in the country, at least compared with the category C schools.

Several of these category C schools that had not had any students in the two highest two highest proficiency levels in 2022 had several in 2023 – six schools in reading, five in science, and four each in mathematics and 21st century skills. Several of these category C schools also experienced declines in the percentages of students in the two lowest proficiency levels. These declines suggest progress, but perhaps not as much as expected and surely not as much as required to achieve SETP's ultimate goal. All category C schools had more than 50 percent of their students in the two lowest proficiency levels in all four subjects in 2023. Some schools had more than 80 percent of their students in the two lowest levels.

Despite admirable intentions among the leadership of all SETP schools to achieve the desired results, their teachers face challenges beyond their control. High rates of absenteeism are common, and many young adults who should be in classrooms are not. Over 40 percent of the students in the SETP schools were absent at the time of the 2023 assessments. Students who are consistently absent are those most in need of attention. Had these students been assessed in 2023, the percentages of the least proficient students would be higher than they already are.

Among the students who are in school, many do not devote much time to studying outside of school, especially for science. Almost 90 percent of the students assessed in science in 2023 reported that they spend four hours or less studying science outside the classroom each week (versus nearly 50 percent for reading and almost 43 percent for mathematics). Comparing the students who studied the three core

[17] There is also reason to believe that poorly prepared student are at risk of boredom and problems with discipline.
[18] For example, among the 12 schools in 2023, the three in categories A (Bolgatanga SHS) and B (Benso SHTS and Bosome SHS) had the three highest proficiency scores in 21st century skills and two of the three highest proficiency scores in reading, science, and mathematics.

subjects the most (eight or more hours per week) versus those who studied the least (two or fewer hours per week), the former groups had higher mean scores in science and reading. There was not much difference in mathematics.

Students who studied the most were more likely to be in the two highest levels of proficiency in the three core subjects compared with those who studied the least. Nonetheless, many students, especially in science and reading, who studied the least were also in the top two levels of proficiency. This finding suggests that the number of hours spent studying outside of school may be less important than the quality of the time devoted to study. The finding further suggests that students would benefit from learning (and being taught) how best to study and to use their time productively. Students who do spend the most time studying outside of school and who do not achieve the results they expect may be both disappointed and disenchanted. Some may conclude that extra study is of little value, but this is clearly an undesirable conclusion.

Parents can help and encourage their children to study at home by ensuring that a desk or study area is available. Considering students' age, attendance at remedial classes, having a relevant textbook at home for studying, hours spent studying, and having a desk at home for studying, the latter provides the single best explanation for differences in proficiency in reading, science, and mathematics. Unfortunately, many students do not have access to desk or dedicated study area at home. These findings suggest the desirability of schools informing parents of the likely benefits of such a study area before students begin their secondary education.

Understanding the nature of the SETP provides further context for the results achieved. In addition to the two shared goals mentioned above for all schools, they were encouraged to select two to three additional goals to be included in their school improvement plans. Depending on what the schools and their communities decided, the plans included disparate interventions of varying intensities and durations. The interventions ranged from increasing the availability of teaching and learning resources and equipment, the creation of award schemes for teachers and students, the renovation of existing infrastructure, and increased parental involvement.

The expected results included improvements in teachers' pedagogical practices and competencies that would lead to improvements in students' proficiency in the four subject areas. For some schools, however, there was not a direct linkage between the interventions chosen and changes in levels of proficiency. For example, one school used the resources it was given to improve the supply of potable water; other schools used their programme resources to improve collaboration with their communities. These activities are of value and easily justified in terms of enhancing a school's learning environment, but their contribution to improved proficiency is uncertain and not easily measured. No less important, it is not always possible to link or partition all the individual interventions to changes in levels of proficiency.

In contrast, it is possible to link some programme activities with what teachers do and how they teach. PLC were organised for teachers in all SETP schools. PLC sessions, usually 90 minutes in length, took place every week, and teachers were incentivised to attend. Across all SETP schools, 8 in every 10 teacher attended the sessions regularly. GES and T-TEL prepared handbooks covering different themes. The first handbook covered the NTS, the second on literacy across the curriculum.

These PLC sessions had led to almost every 2 in 10 SETP teacher demonstrating the NTS when the teachers were observed several months after the completion of the PLC handbooks.

A key area of concern involves teachers' motivation and desire to stay in the profession. Both of these traits may be evident to students, such as when their teachers are absent, late to class, or do not convey enthusiasm for learning. When asked about their motivation and willingness to remain in the profession, less than 15 percent of teachers across all 12 SETP schools responded affirmatively. In half of the 12 schools, only 5 to 6 percent of the teachers claimed to be motivated and interested in remaining in the

profession. Teachers with the least experience were the most likely *not* to want to remain in the profession.

The most common complaint among teachers is a chronic problem; they are not paid on time. Furthermore, nearly 90 percent of the surveyed teachers believe that their pay is insufficient to support their needs. These factors understandably sap teachers' motivation and desire to stay in the profession. Remedying either problem has the potential to enhance both motivation and retention.

From students' perspective SETP can point to several notable achievements related to the environment in which students live and learn. At the baseline no teachers met the criteria for the use of GESI-responsive instructional strategies. Slightly more than a year later, these strategies were observed in all but three of the SETP schools. Alas, the three are category C schools. Seven of the 12 SETP schools now have an inclusive gender-sensitive environment for staff and students. Only two did so at SETP's inauguration.

The positive results of SETP's interventions are also evident in the leadership of the programme's schools. Based on interviews with these leaders, there is evidence of considerable improvement in their performance of their responsibilities and in the development or improvement of their school improvement plans. In 2022, about 90 percent of the schools' leaders demonstrated only a "fair" understanding of their roles and responsibilities. By 2023, however, more than 80 percent demonstrated either a "good" or "excellent" understanding of their roles.

In sum, it is fair to say that both much and little has changed as a result of SETP's interventions. The data collection in both years convincingly demonstrates the need and value of the data collected. The results identify the schools in which students' proficiency is improving and those where it is not. Both groups of schools can provide lessons about which strategies are most and less effective in preparing students for further education or the world of work. The assessments also usefully identify students' areas of strengths and weaknesses in the four subject areas and thus provide a road map of which areas merit further attention. These include the use of scientific evidence, employing mathematical concepts and procedures, financial literacy, and critical thinking.

The assessments further reveal the difficulty and challenges in reversing the seemingly widespread academic deficiencies accumulated in many students' first nine years of formal education. Education reform can be slow, especially in the context in which Ghana's secondary schools operate. Change depends on several factors beyond the control or influence of even the best-intentioned and most-competent teachers and school leaders. What can be influenced – how and what teachers teach – is within the influence of the educational system and should be pursued but attention also needs to be devoted to the factors that influence teachers' motivation and retention.

Addressing these issues is essential; without doing so progress will be constrained and many students will not find themselves well prepared either for further education or the world of work. The solution is a cadre of well-qualified, motivated, and high-performing teachers. As the World Bank has reported, the most effective education interventions work through teachers. Going from low-performing teachers to high-performing ones can increase learning outcomes dramatically. In contrast, mediocre teachers do little to prepare students for success and may actually hinder the prospects of students with high potential[19]. Young people may represent only a small part of Ghana's population but they represent 100 percent of the country's future. In short, what and how these young people learn will largely determine Ghana's social, economic, and political development for decades. For this reason, Ghana and its

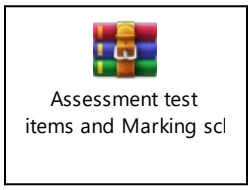
[19] Tara Béteille and David K. Evans, *Successful Teachers, Successful Students: Recruiting and Supporting Society's Most Crucial Profession* (Washington, DC: The World Bank, 2019); available at Jan2019_SuccessfulTeachers_PrintVersion (worldbank.org)

secondary schools can ill-afford to produce large numbers of poorly educated citizens. SETP's efforts have recognised this challenge and, arguably, provide the best and most comprehensive solution to this challenge.

6.0 Annexes

Annex 1

Student Assessment questions



Annex 2

Annex 2

Table A2.1 Percentage of students at different levels of reading proficiency – by school

	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching Proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023
Benso SHTS	0.0	14.3	8.5	11.4	28.2	25.7	39.4	25.7	23.9	22.9
Bolga SHS	1.1	8.4	10.8	10.6	16.5	21.5	37.5	18.6	34.1	41.1
Bosome SHS	4.6	9.5	9.2	7.9	21.5	9.5	34.6	19.1	30.0	54.0
E.P. Agriculture SHS	0.0	0.0	0.0	2.3	1.5	9.3	20.3	14.0	78.3	74.4
Gambaga Girls SHS	0.7	0.0	0.0	5.1	1.4	4.1	17.0	24.5	80.9	66.3
Lambussie Community Day SHS	0.0	4.2	2.0	10.4	15.7	12.5	43.1	25.0	39.2	47.9
Mangoase SHS	0.0	3.6	2.5	13.3	13.1	15.2	36.4	26.7	48.0	41.2
Nabango Community SHS	0.0	2.9	0.0	14.7	0.0	8.8	11.1	20.6	88.9	52.9
Ogyeedom Community SHTS	0.0	9.4	0.0	12.5	16.0	25.0	52.0	25.0	32.0	28.1
Walewale Vocational Technical Institute	0.0	0.0	0.9	1.2	0.0	3.5	17.4	8.2	81.7	87.1
Zabzugu SHS	0.0	3.4	0.9	12.2	7.3	13.5	33.9	18.9	57.8	52.0
Ziavi Community SHTS	0.0	5.1	0.0	7.7	11.9	18.0	42.9	10.3	45.2	59.0
Overall	0.8	5.2	4.0	9.5	11.5	14.2	31.6	19.9	68.5	51.2

Table A2.2 Percentage of students at different levels of science proficiency – by school

	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching Proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023
Benso SHTS	0.0	6.1*	8.5	3.0*	28.2	39.4*	39.4	30.3*	23.9	21.2*
Bolga SHS	1.1	22.1*	10.8	21.5*	16.5	25.4*	37.5	18.9*	34.1	12.1*
Bosome SHS	4.6	9.8*	9.2	17.2*	21.5	23.8*	34.6	25.4*	30	23.8*
E.P. Agriculture SHS	0.0	0.0	0.0	4.6*	1.5	25.0*	20.3	22.7*	78.3	47.7*
Gambaga Girls SHS	0.7	2.1*	0.0	4.1*	1.4	12.4*	17.0	26.8*	80.9	54.6*
Lambussie Community Day SHS	0.0	2.1*	2.0	14.6*	15.7	25.0*	43.1	37.5*	39.2	20.8*
Mangoase SHS	0.0	1.9*	2.5	9.4*	13.1	20.6*	36.4	25.6*	48	42.5*
Nabango Community SHS	0.0	0.0	0.0	6.3*	0.0	15.6*	11.1	37.5*	88.9	40.6*

Ogyeedom Community SHTS	0.0	0.0	0.0	12.9*	16.0	29.0*	52.0	29.0*	32.0	29.0*
Walewale Vocational Technical Institute	0.0	0.0	0.9	3.5*	0.0	13.8*	17.4	19.5*	81.7	63.2*
Zabzugu SHS	0.0	1.1*	0.9	3.3*	7.3	12.0*	33.9	23.0	57.8	60.7*
Ziavi Community SHTS	0.0	2.8*	0.0	13.9*	11.9	25.0*	42.9	30.6*	45.2	27.8*
Overall	0.8	8.1	4.0	11.8*	11.5	20.9*	31.6	24.0*	52.1	35.2*

Table A2.3 Percentage of students at different levels of science proficiency – by school and year

School		Highly Proficient (80-100%)	Proficient (68-79%)	Approaching Proficiency (54-67%)	Developing (40-53%)	Emerging (0-39%)
Benso SHTS	Third-year - 2022	0.0	8.5	28.2	39.4	23.9
	Third-year - 2023	6.1*	3.0*	39.4*	30.3*	21.2*
Bolga SHS	Third-year - 2022	1.1	10.8	16.5	37.5	34.1
	Third-year - 2023	22.1*	21.5*	25.4*	18.9*	12.1*
Bosome SHS	Third-year - 2022	4.6	9.2	21.5	34.6	30
	Third-year - 2023	9.8*	17.2*	23.8*	25.4*	23.8*
E.P. Agriculture SHS	Third-year - 2022	0.0	0.0	1.5	20.3	78.3
	Third-year - 2023	0.0	4.6*	25.0*	22.7*	47.7*
Gambaga Girls SHS	Third-year - 2022	0.7	0.0	1.4	17.0	80.9
	Third-year - 2023	2.1*	4.1*	12.4*	26.8*	54.6*
Lambussie Community Day SHS	Third-year - 2022	0.0	2.0	15.7	43.1	39.2
	Third-year - 2023	2.1*	14.6*	25.0*	37.5*	20.8*
Mangoase SHS	Third-year - 2022	0.0	2.5	13.1	36.4	48
	Third-year - 2023	1.9*	9.4*	20.6*	25.6*	42.5*
Nabango Community SHS	Third-year - 2022	0.0	0.0	0.0	11.1	88.9
	Third-year - 2023	0.0	6.3*	15.6*	37.5*	40.6*

Ogyeedom Community SHTS	Third-year - 2022	0.0	0.0	16.0	52.0	32.0
	Third-year - 2023	0.0	12.9*	29.0*	29.0	29.0*
Walewale Vocational Technical Institute	Third-year - 2022	0.0	0.9	0.0	17.4	81.7
	Third-year - 2023	0.0	3.5*	13.8*	19.5*	63.2*
Zabzugu SHS	Third-year - 2022	0.0	0.9	7.3	33.9	57.8
	Third-year - 2023	1.1*	3.3*	12.0*	23.0	60.7*
Ziavi Community SHTS	Third-year - 2022	0.0	0.0	11.9	42.9	45.2
	Third-year - 2023	2.8*	13.9*	25.0*	30.6*	35.2*

Table A2.4 Percentage of students' performance in science literacy – by school and hours spent studying.

School	Less than 2 hours	2-4 hours a week	5-7 hours a week |	8 or more hours a week
Benso SHTS	0.0	0.0	66.7	33.3
Bolga SHS	1.6	27.4	34.4	36.7
Bosome SHS	0.0	27.6	27.6	44.8
E.P. Agriculture SHS	75.0	25.0	0.0	0.0
Gambaga Girls SHS	25.0	12.5	25.0	37.5
Lambussie Community Day SHS	17.7	11.8	47.1	23.5
Mangoase SHS	0.0	100.0	0.0	0.0
Nabango Community SHS	0.0	100.0	0.0	0.0
Ogyeedom Community SHTS	0.0	50.0	0.0	50.0
Walewale Vocational Technical Institute	0.0	50.0	0.0	50.0
Zabzugu SHS	0.0	16.7	66.7	16.7
Ziavi Community SHTS	33.3	50.0	0.0	16.7
Overall	17.3	24.3	33.4	25.0

Table A2.5 Mean Score of students' performance in science literacy – by school and hours spent studying.

School	Less than 2 hours	2-4 hours a week	5-7 hours a week |	8 or more hours a week
Benso SHTS	54.28	52.06	53.14	54.28
Bolgatanga SHS	59.52	67.18	65.45	71.04
Bosome SHS	50.86	58.57	58.06	64.13
E.P. Agriculture SHS	40.00	43.81	42.68	40.61
Gambaga Girls SHS	49.48	59.05	50.39	54.29
Lambussie Community Day SHS	41.14	44.69	49.92	50.98
Mangoase SHS	49.43	41.90	48.57	49.43
Nabango Community SHS	27.14	56.36	47.14	40.00
Ogyeedom Community SHTS	43.00	49.05	35.24	46.35
Walewale Vocational Technical Institute	46.86	38.99	36.67	46.86
Zabzugu SHS	46.67	42.21	44.38	41.49
Ziavi Community SHTS	46.29	55.58	41.43	50.48
Overall	43.7	55,77	53.82	57.35

Table A2.6 Percentage of students at different levels of mathematics proficiency – by school

	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching Proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023
Benso SHTS	2.2	0.0	14	8.6	30.1	31.4	40.9	37.1	12.9	22.9
Bolgatanga SHS	7.4	10.4	10.6	11.7	30.1	29.7	36.3	36.0	15.6	12.3
Bosome SHS	1.5	2.4	5.2	5.5	25.9	21.3	51.9	52.0	15.6	18.9
E.P. Agriculture SHS	0	0.0	1.4	4.7	19.4	11.6	38.9	51.2	40.3	32.6
Gambaga Girls SHS	0	0.0	0	1.0	9.8	13.4	40.6	51.6	49.7	34.0

Lambussie Community Day SHS	0	0.0	8.3	6.5	31.3	39.1	39.6	43.5	20.8	10.9
Mangoase SHS	1.7	0.0	6.2	4.8	24.7	19.3	38.8	53.6	28.7	22.3
Nabango Community SHS	0	0.0	0	3.2	25	29.0	37.5	25.8	37.5	41.9
Ogyeedom Community SHTS	0	0.0	0	8.3	37.5	22.2	31.3	44.4	31.3	25.0
Walewale Vocational Technical Institute	0	0.0	0.9	1.2	7.4	14.9	50.9	50.6	40.7	33.3
Zabzugu SHS	1.4	0.5	0.7	1.6	17.7	23.4	42.6	45.7	37.6	28.8
Ziavi Community SHTS	0	0.0	0	10.0	21.6	17.5	37.8	52.5	40.5	20.0
Overall	2.3	3.1	4.7	6.0	22.9	23.2	41.4	45.2	28.7	22.5

Table A2.9 Students' performance in different aspects of mathematics literacy, by school (mean percent)

school	Quantity	Space and shape	Change and relationship	Uncertainty and data	Formulating situations mathematically	Employing mathematical concepts, facts, procedures, and reasoning	Interpreting, applying, and evaluating mathematical outcomes	Low	Medium	High
Benso SHTS	42.4	55.0	56.4	53.2	48.5	41.3	64.1	60.0	43.8	39.4
Bolgatanga SHS	47.9	64.3	60.5	61.3	53.2	51.8	64.1	62.1	52.0	45.5
Bosome SHS	38.9	57.9	51.2	54.3	44.9	42.5	60.1	55.8	43.1	36.7
Gambaga Girls SHS	35.2	53.2	43.3	47.6	38.2	36.3	54.4	50.8	38.3	33.7
Lambussie Community SHS	45.2	59.4	56.3	54.0	46.7	43.7	58.5	58.0	46.7	42.6
Mangoase SHS	38.7	57.3	50.7	50.2	42.9	39.5	56.5	53.8	41.0	37.9
Nabango SHTS	41.7	55.8	46.8	47.2	40.7	40.9	50.2	48.2	42.6	35.2
Ogyeedom Community SHTS	44.5	56.2	48.6	50.9	42.6	44.0	53.3	55.5	41.9	37.9
E.P. Agriculture	41.3	55.3	44.2	47.1	37.4	38.9	51.6	50.7	40.0	35.8
Walewale Vocational Technical Institute	39.1	57.9	40.5	47.7	38.8	38.6	51.6	50.4	37.1	37.4
Zabzugu SHS	39.3	53.0	48.4	50.4	42.3	39.6	57.3	54.5	39.5	37.4
Ziavi Community SHTS	39.1	54.5	48.8	54.2	46.3	43.3	62.1	60.9	39.8	36.6
Total	41.7	58.1	51.6	53.4	45.2	43.2	58.5	56.2	43.7	39.3

Table A2.10 Proficiency in 21st century by school

	Highly Proficient (80-100%)		Proficient (68-79%)		Approaching Proficiency (54-67%)		Developing (40-53%)		Emerging (0-39%)	
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023
Benso SHTS	0.0	3.2	1.3	9.7	42.1	32.3	38.2	41.9	18.4	12.9
Bolgatanga SHS	0.5	4.8	7.0	26.5	36.5	39.0	36.5	22.6	19.6	7.1
Bosome SHS	0.0	0.8	8.4	13.4	40.0	33.9	33.6	40.2	18.1	11.8
Gambaga Girls SHS	0.0	0.0	0.7	5.2	4.2	14.6	28.0	42.7	67.1	37.5
Lambussie Community Day SHS	0.0	0.0	0.0	4.2	6.5	25.0	56.5	41.7	37.0	29.2
Mangoase SHS	0.0	0.6	4.4	7.9	20.6	40.6	42.7	36.4	32.4	14.6
Nabango SHTS	0.0	0.0	0.0	2.5	8.0	25.0	48.0	32.5	44.0	40.0
Ogyeedom Community SHTS	0.0	0.0	5.0	8.0	30.0	32.0	45.0	40.0	20.0	20.0
E.P. Agriculture SHS	0.0	2.3	0.0	2.3	5.4	16.3	33.8	51.2	60.8	27.9
Walewale Vocational Technical Institute	0.0	0.0	0.0	3.5	7.1	10.3	30.4	34.5	62.5	51.7
Zabzugu SHS	0.0	0.5	0.6	4.8	11.3	19.1	42.1	38.1	45.9	37.6
Ziavi Community SHTS	0.0	0.0	2.6	6.8	42.1	27.3	39.5	22.7	15.8	43.2

Table A2.11 Mean score in 21st Century by school

	2022	2023	% improvement
Bolgatanga SHS	60.3	50.4	9.9
E.P. Agriculture	45.5	36.9	8.6
Mangoase SHS	53.1	44.6	8.5
Gambaga Girls SHS	43.3	35.4	7.8
Lambussie Community SHS	46.6	41.6	5.1
Benso SHTS	54.2	49.4	4.7
Nabango SHTS	44.6	40.2	4.4
Zabzugu SHS	43.7	39.4	4.4
Bosome SHS	53.5	50.5	2.9
Walewale Vocational Technical Institute	39.9	37.0	2.9
Ogyeedom Community SHTS	50.2	49.1	1.1
Ziavi Community SHTS	45.4	50.1	-4.7

Table A2.12 Students' performance in different aspects of 21st century skills by school- survey 2023 (mean percent)

School	Discipline and Integrity	Responsible citizenship	Cultural identity, civic literacy, and global citizenship	ICT and digital literacy	Self-discipline	Adaptability and resourcefulness	Leadership	Financial literacy and entrepreneurship	Critical thinking and problem-solving
Benso SHTS	57.2	38.2	61.3	51.0	67.7	59.1	47.7	53.8	28.3
Bolgatanga SHS	59.3	46.2	59.1	59.8	78.0	56.5	63.2	57.4	32.2
Bosome SHS	49.0	39.5	55.6	52.4	71.7	51.2	55.7	53.8	31.1
Gambaga Girls SHS	43.2	32.1	45.8	42.3	58.3	42.4	37.3	43.4	24.5
Lambussie Community SHS	48.3	35.1	45.8	44.2	60.9	43.1	43.8	47.2	25.5
Mangoase SHS	50.1	42.0	55.2	52.4	70.6	48.3	54.8	52.9	28.7
Nabango SHTS	39.8	33.2	49.2	36.5	63.1	42.5	39.0	45.8	32.5
Ogyeedom Community SHTS	55.6	37.1	57.3	48.0	59.0	49.3	45.6	42.7	26.2
E.P. Agriculture	43.6	36.2	48.1	32.6	61.0	44.2	42.8	50.4	29.5
Walewale Vocational Technical Institute	36.5	31.5	46.0	37.5	54.3	44.4	35.4	38.7	22.9
Zabzugu SHS	46.1	34.7	47.8	36.0	60.4	42.3	37.7	36.3	25.3
Ziavi Community SHTS	44.2	32.8	57.6	43.6	56.8	37.9	43.2	40.2	28.5
Total	49.8	39.0	53.3	48.1	67.3	48.6	49.7	48.8	28.6

Table A2.13 Teachers who are motivated and want to remain in the profession by year (%)

	Proportion of teachers who are motivated (%)
Benso SHTS	19.1
Bolgatanga SHS	5.3
Bosome SHS	9.5
Gambaga Girls SHS	25.0
Lambussie Community Day SHS	5.0
Mangoase SHS	20.0
Nabango SHTS	15.0

Ogyeedom Community SH	5.0
E.P. Agriculture SHS	4.8
Walewale Vocational Technical Institute	27.3
Zabzugu SHS	5.6
Ziavi Community SHTS	5.0
Overall	12.4

Table A2.14 Rotation matrix of 34 survey questions of teachers

Variable	Factor 1	Factor 2	Factor 3	Uniqueness
Teaching is mentally draining.	-0.032	0.3713	0.0181	0.8397
With the help of my colleagues, we can solve student issues	0.2932	0.031	0.0607	0.751
I feel exhausted at the end of the school day	0.1344	0.6033*	-0.0034	0.5946
My pay as a teacher is insufficient to support my family	0.2079	0.4238	0.025	0.7061
I feel fatigued when I get up in the morning and have to face another day at school	0.0184	0.6357*	-0.0048	0.5801
I have the ability to get parents involved in their children's education	0.1941	0.0512	0.139	0.74
I ask my colleagues for feedback.	0.1912	0.1322	0.0533	0.6848
With the help of my colleagues, we can identify innovative practices.	0.3308	0.0441	0.0617	0.6771
As a teacher, I'm given more responsibilities than I can manage	-0.0368	0.4512	0.0056	0.7208
Some teachers at my school want to transfer to another school	0.1172	0.2448	-0.1079	0.8046
I do not get paid on time.	-0.1403	0.1583	0.0622	0.8614
I can make my classroom a safe space for students, both emotionally and physically	0.4517	-0.0441	0.0947	0.6527
As a teacher, I am contributing positively to the lives of my students	0.4874	0.099	0.036	0.5767
I feel energized when my class greets me each morning	0.238	0.0322	0.1476	0.7622
If I had to choose again, I would still want to be a teacher	-0.0188	-0.1734	0.2041	0.65
My headteacher treat me with respect	0.234	0.0094	0.5517*	0.6126
My colleagues at school make work a fun place to be.	0.2093	0.0424	0.1534	0.8402
My headteacher praises me for my efforts in the school.	0.1635	0.0103	0.6455*	0.534
Parents value my work as a teacher	0.1104	-0.1046	0.4037	0.6757
I plan lessons with a colleague.	0.105	0.026	0.1524	0.7734
I feel confident about my abilities as a teacher	0.6046*	0.0464	0.1067	0.5816
If a student does not remember information in a previous lesson, I would know how to help them remember	0.6262*	0.0551	0.1183	0.5555
When a student gets a better grade than he or she usually gets, it is because I found a better way	0.4186	0.0721	0.1099	0.7011
If a student in my class is undisciplined, I know some techniques to direct him or her	0.5958*	0.0502	0.0998	0.5505

Every teacher can continue to improve their practice throughout their career	0.5934*	-0.0185	0.0761	0.6109
I can get through to even the most difficult or unmotivated students	0.5431*	0.014	0.0777	0.5734
I can motivate students who show low interest in school.	0.5262*	0.0574	0.0653	0.6359
I can influence some of the decisions that are made in the school.	0.0701	0.043	0.2194	0.7256
I can get students to work in groups or pairs	0.6091*	0.0387	0.0633	0.578
I ask my supervisor for feedback	0.2948	0.0434	0.2311	0.6325
I can help students overcome some difficult home and community conditions	0.3628	0.0369	0.1298	0.662
Teachers in my schoolwork closely with the district SISOs (formerly circuit supervisors)	0.046	-0.0006	0.2574	0.7752
If I were offered another job outside the teaching profession at about the same or a slightly higher salary, I would accept that offer	0.0771	0.2592	-0.0756	0.6791
As a teacher, I am contributing positively to the lives of my students.	0.6126*	0.0639	0.0645	0.5375
Eigenvalues	4.204	1.548	1.313	
Percentage of total variance	0.4888	0.18	0.1526	
Number of test measures	8	2	2	

*Factor loadings ≥0.5

Table A2.15 Proportion of teachers demonstrating understanding and application of NTS

School	Percentage
Benso SHTS	43.8
Bolgatanga SHS	37.5
Gambaga Girls SHS	33.3
E.P. Agriculture SHS	33.3
Walewale Vocational Technical Institute	33.3
Nabango SHTS	13.3
Ogyeedom Community SHTS	13.3
Lambussie Community Day SHS	7.1
Mangoase SHS	7.1
Zabzugu SHS	6.7
Bosome SHS	0.0
Ziavi Community SHTS	0.0

Table A2.16 Teachers who received training in digital technologies, by school (%)

School	Percentage
Ogyeedom Community SHTS	90.0
Walewale Vocational Technical Institute	81.8
Bosome SHS	76.2
Mangoase SHS	70.0
Bolgatanga SHS	63.2
Benso SHTS	55.0

Lambussie Community Day SHS	55.0
Gambaga Girls SHS	52.6
Nabango SHTS	40.0
Zabzugu SHS	27.8
E.P. Agriculture SHS	23.8
Ziavi Community SHTS	10.0

Table A2.17 Proportion of SETP teachers demonstrating GESI-responsive pedagogy, by school (%)

School	Percentage
Benso SHTS	37.5
Bolgatanga SHS	37.5
E.P. Agriculture SHS	33.3
Gambaga Girls SHS	26.7
Walewale Vocational Technical Institute	20.0
Nabango SHTS	13.3
Lambussie Community Day SHS	7.1
Mangoase SHS	7.1
Ogyeedom Community SHTS	6.7
Bosome SHS	0.0
Zabzugu SHS	0.0
Ziavi Community SHTS	0.0

Table A2.18 Output of multiple linear regression of NTS scores

Category	Coeff (*Sig)	CI
Sex		
Male	Reference	
Female	-.000	-3.682, 3.681
Years of teaching		
Less than 5 years	Reference	
5 to 10 years	0.330	-3.606, 4.267
More than 10 years	-1.465	-5.584, 2.653
School category		
Category A	Reference	
Category B	2.947	-4.295, 10.188
Category C	-6.349*	-11.837, -0.8607
School sex		
Single-sex	Reference	
Mixed-sex	4.629	0.453,8.804

Table A2.19 – Progress in SETP heads of schools demonstrating understanding of their roles and responsibilities– (%)

	2022	2023
Excellent	8.3	66.7
Good	0.0	16.7
Fair	0.0	8.3

Poor	91.7	8.3

Table A2.20 – Progress in SETP schools with inclusive environment for staff and students– (%)

	2022	2023
Excellent	16.7	58.3
Good	33.3	41.7
Fair	25.0	0.0
Poor	25.0	0.0