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STEM Career Choice of Senior High School Students: A Social Cognitive Career Theory Framework

Philip Dorsah
University of Technology and Applied Sciences, Navrongo, Ghana
https://orcid.org/0000-0002-3314-2203

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ABSTRACT:
This study examined STEM career aspirations among Senior High School students and the extent to which STEM self-efficacy, STEM outcome expectations, perceived environmental supports and barriers, and STEM interest predict STEM career aspirations. Guided by Social Cognitive Career Theory (SCCT), the study adopted a positivist philosophical stance and a quantitative descriptive cross-sectional survey design. A multistage sampling technique was used to select 109 Form Two students from two public Senior High Schools in the Kasena-Nankana Municipality, Ghana. Data were collected using the Factors Influencing STEM Career Choice Questionnaire (FISCCQ) and analysed using descriptive statistics and multiple regression analysis. Findings indicated that students generally demonstrated high STEM career aspirations, self-efficacy, outcome expectations, and interest, but perceived moderate environmental support for STEM career development. Multiple regression analysis showed that the four predictors collectively explained 53.6% of the variance in STEM career aspirations, $F(4, 104) = 30.05$, $p < .001$, $R^2 = .536$. STEM outcome expectations ($\beta = .419$, $p < .001$) and STEM interest ($\beta = .396$, $p < .001$) significantly and positively predicted STEM career aspirations. However, STEM self-efficacy ($\beta = -.143$, $p = .078$) and perceived environmental supports and barriers ($\beta = .118$, $p = .132$) were not significant predictors. The study concludes that positive outcome expectations and STEM interest are the strongest predictors of students' career aspirations. It recommends strengthening STEM career guidance, mentorship programmes, and engaging STEM learning experiences to encourage students' participation in STEM pathways.

KEY WORDS: STEM career aspirations, STEM interest, self-efficacy, outcome expectations, environmental supports, social cognitive career theory

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1.0 INTRODUCTION

Globally, studies have shown that students' STEM career choices are influenced by several psychological, social, cultural, and educational factors. These include self-efficacy beliefs, outcome expectations, parental influence, teacher support, gender stereotypes, career awareness, and learning experiences (Jiang et al., 2024; Wang & Degol, 2013; Mansour, 2025). The Social Cognitive Career Theory (SCCT) has become one of the most widely used frameworks for explaining how these factors shape students' career interests and decisions. SCCT posits that career choices are influenced by the interaction among self-efficacy beliefs, outcome expectations, personal interests, environmental supports, and perceived barriers. According to the theory, students who believe they are capable of succeeding in STEM subjects and perceive STEM careers as rewarding are more likely to develop interest and pursue careers in STEM-related fields.

In recent years, several empirical studies have explored factors influencing STEM career aspirations among adolescents and secondary school students across different countries. For instance, Chen et al. (2022) found that students' self-efficacy and

parental expectations significantly predicted STEM career aspirations among secondary school students. Similarly, Caspi and Gorsky (2024) reported that motivation to learn mathematics mediated the relationship between classroom environments and STEM career expectations across different countries. Jiang et al. (2024) also established that self-efficacy and outcome expectations significantly influenced students' STEM career interests. Additionally, Dökme and Hancıoğlu (2025) demonstrated that participation in robotics-based STEM programmes enhanced students' interest in STEM careers and attitudes toward science.

Environmental factors have also been identified as important determinants of STEM career choices. Studies have revealed that parental encouragement, teacher support, mentoring opportunities, and access to STEM learning resources positively influence students' interest in STEM careers (Awoniyi & Jokotagba, 2025; Wulani et al., 2025). Conversely, barriers such as poor laboratory facilities, inadequate career guidance, financial challenges, and gender stereotypes negatively affect students' willingness to pursue STEM careers (Iroaganachi et al., 2021; Kanyuma et al., 2025). Gender disparities continue to persist globally, with females often underrepresented in engineering, technology, and physical science careers due to sociocultural expectations and lower STEM self-confidence (Li & Liu, 2026; Diniz et al., 2025).

Within the Ghanaian context, the promotion of STEM education has become a national priority due to the country's aspirations for industrial and technological advancement. The government of Ghana has introduced several educational reforms and STEM initiatives aimed at increasing students' participation in science and technology-related programmes at the pre-tertiary and tertiary levels. These initiatives include the establishment of STEM senior high schools, science resource centres, robotics competitions, and increased emphasis on science and mathematics education. Despite these interventions, many Senior High School students still demonstrate low participation and interest in STEM-related career pathways, particularly among female students and students from disadvantaged backgrounds.

Emerging evidence from Ghana suggests that STEM career aspirations among adolescents are shaped by both individual and contextual factors. Batul et al. (2026), in a study grounded in SCCT, found that Ghanaian adolescents' STEM career interests were influenced by self-efficacy beliefs, science identity, and environmental experiences. Similarly, Awoniyi and Jokotagba (2025) reported that parental influence, career counselling, and role models significantly shaped girls' STEM career choices in public universities in Ghana. These findings suggest that career-related decisions among Ghanaian students are not determined solely by academic ability but also by social support systems and exposure to STEM opportunities.

At the Senior High School level in Ghana, students are expected to make important academic and career decisions that influence their future educational and occupational trajectories. However, many students encounter challenges such as inadequate STEM facilities, limited career guidance services, lack of exposure to STEM professionals, and societal stereotypes regarding certain careers. These challenges may reduce students' confidence and interest in pursuing STEM careers. Furthermore, there is limited empirical research focusing specifically on Ghanaian Senior High School students' STEM career choices using the SCCT framework. Existing studies have largely concentrated on university students or broader educational contexts, leaving a gap in understanding how psychological and environmental factors interact to shape STEM career aspirations among SHS students in Ghana.

Given the importance of STEM careers to national development and the need to strengthen students' participation in STEM pathways, it is necessary to investigate the factors influencing STEM career choice among Senior High School students in Ghana. Understanding how self-efficacy beliefs, outcome expectations, environmental supports and barriers, and STEM interests influence students' career aspirations may provide useful insights for educators, policymakers, parents, and guidance counsellors. The findings of such a study could inform the design of interventions and policies aimed at improving STEM participation and career development among Ghanaian secondary school students.

1.1 Problem Statement

The growing importance of STEM Education to economic growth, technological innovation, and national development has increased the demand for skilled professionals in science, technology, engineering, and mathematics (STEM)-related fields worldwide. Consequently, many countries have intensified efforts to encourage students' participation in STEM education and careers. Despite these efforts, studies continue to report low interest and participation in STEM career pathways among secondary school students, especially females and students from disadvantaged backgrounds (Zhou & Shirazi, 2025; López et al., 2023).

This situation has become a major concern because inadequate participation in STEM careers may affect the development of a skilled workforce needed for industrial and scientific advancement. Several studies have identified multiple factors influencing students' STEM career choices, including self-efficacy beliefs, outcome expectations, parental support, learning experiences, career awareness, and environmental influences (Jiang et al., 2024; Wang & Degol, 2013; Mansour, 2025). According to the Social Cognitive Career Theory, students' career decisions are shaped by the interaction of personal beliefs, interests, environmental supports, and perceived barriers.

Empirical evidence suggests that students with strong confidence in their science and mathematics abilities are more likely to pursue STEM careers (Chen et al., 2022; Xu & Lastrapes, 2022). Similarly, positive outcome expectations such as high income, social prestige, and job opportunities have been found to motivate students toward STEM career aspirations (Caspi & Gorsky, 2024; Rosenzweig & Chen, 2023). Environmental influences also play a critical role in shaping STEM career choices. Studies have shown

that parental encouragement, teacher motivation, role models, and access to STEM learning opportunities positively influence students' STEM aspirations (Awoniyi & Jokotagba, 2025; Wulani et al., 2025). Conversely, barriers such as poor science facilities, lack of guidance and counselling services, financial challenges, and gender stereotypes negatively affect students' participation in STEM-related careers (Iroaganachi et al., 2021; Kanyuma et al., 2025). Additionally, gender disparities in STEM participation continue to persist globally, with female students often reporting lower STEM self-confidence and reduced participation in engineering and technology-related careers (Li & Liu, 2026; Diniz et al., 2025).

In Ghana, the government has introduced several reforms and interventions aimed at promoting STEM education among students. These include the establishment of STEM-focused schools, science resource centres, robotics programmes, and increased investment in science and mathematics education at the pre-tertiary level. Despite these interventions, many Senior High School students still demonstrate low interest and participation in STEM-related careers. Existing evidence suggests that Ghanaian students' STEM career aspirations are influenced by factors such as parental support, career counselling, self-efficacy, and access to role models (Awoniyi & Jokotagba, 2025; Batul et al., 2026). However, many students continue to encounter challenges such as inadequate STEM facilities, limited exposure to STEM professionals, insufficient career guidance, and sociocultural stereotypes that may discourage them from pursuing STEM careers.

Although several international studies have examined factors influencing STEM career choice, there is limited empirical research focusing specifically on Senior High School students in Ghana using the Social Cognitive Career Theory framework. Most existing studies have focused on university students, broader educational populations, or contexts outside Ghana, making it difficult to fully understand the factors influencing STEM career aspirations among Ghanaian SHS students. Furthermore, there is insufficient evidence regarding how self-efficacy beliefs, outcome expectations, environmental supports and barriers, and STEM interests collectively shape the STEM career choices of SHS students in the Ghanaian educational context.

Therefore, there is a need to investigate the factors influencing STEM career choice among Senior High School students in Ghana based on the Social Cognitive Career Theory framework. Such a study is necessary to provide empirical evidence that can guide educators, policymakers, parents, and guidance counsellors in designing effective interventions to enhance students' participation and interest in STEM careers.

1.2 Research Questions

1. What is the level of STEM career aspirations among Senior High School students?
2. What is the level of STEM self-efficacy beliefs among Senior High School students?
3. What is the level of STEM outcome expectations among Senior High School students?
4. What is the level of perceived environmental supports and barriers among Senior High School students?
5. What is the level of STEM interest among Senior High School students?
6. To what extent do STEM self-efficacy beliefs, STEM outcome expectations, perceived environmental supports and barriers, and STEM interest predict Senior High School students' STEM career aspirations?

2.0 THEORETICAL FRAMEWORK

This study is anchored in the Social Cognitive Career Theory (SCCT), originally proposed by Lent, Brown, and Hackett (1994). The theory is an extension of Bandura's social cognitive theory and provides a comprehensive framework for understanding how individuals develop career interests, make academic and occupational choices, and achieve career goals. SCCT is particularly useful for explaining students' STEM career decisions because it integrates both personal cognitive factors and contextual environmental influences. SCCT posits that career development is primarily influenced by the interaction of five major constructs: self-efficacy beliefs, outcome expectations, interests, goals, and contextual supports and barriers.

Self-efficacy refers to individuals' beliefs about their ability to successfully perform specific tasks. In the context of STEM education, students with strong confidence in their abilities in mathematics, science, and technology are more likely to develop interest in STEM fields and pursue related careers. Prior studies have shown that STEM self-efficacy is a strong predictor of students' career intentions (Chen et al., 2022; Jiang et al., 2024).

Outcome expectations refer to beliefs about the consequences of performing certain behaviours. Students are more likely to pursue STEM careers if they perceive them as offering desirable outcomes such as high income, job security, and social prestige. Empirical studies have demonstrated that positive outcome expectations significantly influence STEM career aspirations (Caspi & Gorsky, 2024; Rosenzweig & Chen, 2023). In SCCT, interests develop from the interaction between self-efficacy and outcome expectations. When students believe they can succeed in STEM subjects and expect positive outcomes, they are more likely to develop sustained interest in STEM-related activities and careers.

Research has shown that STEM interest is a key predictor of career aspirations (Drymiotou et al., 2021; Jiang et al., 2025). Goals represent individuals' intentions to engage in specific academic or career-related activities. In this study, STEM career choice or aspiration represents the behavioural expression of students' goals. SCCT suggests that strong interests and favourable expectations translate into clear career goals, which eventually guide career decisions (Lent, Brown, & Hackett, 1994). Contextual factors play a crucial role in either facilitating or hindering career development. Supports such as parental encouragement, teacher

motivation, mentorship, and access to learning resources enhance students' confidence and motivation. Conversely, barriers such as lack of laboratory facilities, financial constraints, and gender stereotypes may limit students' participation in STEM careers. Studies in different contexts have confirmed the importance of these environmental influences (Awoniyi & Jokotagba, 2025; Kanyuma et al., 2025; Iroaganachi et al., 2021).

2.1 Empirical Review

A substantial body of empirical research has established STEM self-efficacy as a strong predictor of students' career intentions. Chen et al. (2022) found that secondary school students' self-efficacy significantly predicted STEM career aspirations, particularly when combined with perceived parental expectations and cultural capital. Similarly, Jiang et al. (2024) reported that self-efficacy and career awareness jointly influenced STEM career interests among adolescents, with gender differences also evident in levels of confidence and aspiration. In another study, Xu and Lastrapes (2022) demonstrated that students' sense of belonging in STEM contexts significantly influenced their career interest, mediated by STEM attitudes. Likewise, Guo et al. (2026) found that science identity and learning experiences significantly predicted science-related career choices, with self-efficacy playing a mediating role. These findings consistently show that students who believe they are capable in mathematics and science are more likely to pursue STEM-related careers.

Wang and Degol (2013) established that expectancy–value beliefs significantly predict STEM career intentions and explain gender differences in STEM participation. Caspi and Gorsky (2024) further found that students' motivation to learn mathematics mediated the relationship between classroom environments and STEM career expectations across multiple countries. Rosenzweig and Chen (2023) reported that high school students' motivational beliefs significantly influence their preferences for different STEM careers, suggesting that perceived rewards such as income, prestige, and job stability are important motivators. Similarly, Jiang et al. (2024) confirmed that outcome expectations significantly predict STEM career interests, reinforcing the SCCT assumption that perceived benefits of STEM careers shape students' decisions.

Awoniyi and Jokotagba (2025) found that parental influence, career counselling, and role models significantly affect girls' STEM career choices in public universities. Similarly, Wulani et al. (2025) reported that parental encouragement plays a crucial role in enhancing students' interest in STEM careers.

In contrast, several studies have identified barriers that discourage STEM participation. Iroaganachi et al. (2021) found that lack of resources, inadequate guidance services, and environmental constraints significantly reduced STEM career intentions among secondary school girls in Nigeria. Kanyuma et al. (2025) also reported that limited access to guidance and counselling information impeded STEM career choices among secondary school girls in Tanzania. Mansour (2025) further emphasized that sociocultural and institutional factors significantly shape students' STEM career preferences, particularly in developing contexts. These findings indicate that both supportive and restrictive environmental conditions play a critical role in shaping STEM career outcomes. STEM interest has been identified as a key mediator between cognitive beliefs and career choice. Drymiotou et al. (2021) found that career-based learning scenarios significantly enhanced students' interest in science and understanding of STEM careers. Dökme and Hancıoğlu (2025) also reported that robotics-based STEM programmes significantly improved students' interest in STEM careers and attitudes toward science.

Jiang et al. (2025), through a meta-analysis, confirmed that STEM identity and interest are strong predictors of STEM career intentions. Similarly, Fitzgerald et al. (2025) highlighted the importance of measuring career aspirations in STEM fields, showing that interest is a stable and measurable construct linked to long-term career goals. These studies collectively suggest that students' interest in STEM subjects is a strong predictor of their career aspirations and decisions. Empirical evidence also emphasizes the importance of learning experiences in shaping STEM career aspirations.

Chen et al. (2024) found that exposure to STEM learning opportunities significantly influences students' self-concept and perceptions of STEM professionals, which in turn affects career aspirations. Similarly, Drymiotou et al. (2021) demonstrated that career-based scenarios enhance understanding of STEM careers and increase interest. Li et al. (2021), in a qualitative study of high school students in Taiwan, reported that experiential learning, mentorship, and exposure to STEM professionals play a crucial role in shaping students' career development trajectories. These findings align with SCCT's assertion that learning experiences form the foundation of self-efficacy and interest development.

3.0 METHODOLOGY

3.1 Approach

The study adopts a quantitative research approach, underpinned by the positivist philosophical stance. Positivism assumes that reality is objective, measurable, and independent of the researcher. The quantitative research approach is appropriate because it allows for the collection and statistical analysis of numerical data to examine relationships among variables.

3.2 Research Design

The study employs a descriptive cross-sectional survey design. The descriptive aspect allows the researcher to describe the current levels of STEM self-efficacy, outcome expectations, environmental influences, and STEM interest among students. The cross-sectional design enables data to be collected at a single point in time from a sample of Senior High School students in Ghana.

The survey design is appropriate because it facilitates the collection of data from a relatively large population efficiently and allows for generalization of findings.

3.3 Population

The accessible population consists of all Senior High School students in selected public Senior High Schools in the Upper East Region. These students are appropriate because they are at a critical stage of career decision-making, particularly regarding STEM-related academic and career pathways.

3.4 Sample and Sampling

A multistage sampling technique was employed to select participants for the study. Multi-stage cluster samples are constructed by employing two or more layers of cluster sampling in the design (Andres, 2012). In the first stage, two public senior high schools in the Kasena-Nankana Municipality were selected using purposive sampling. These schools were chosen because they offered STEM-related programmes relevant to the study. In the second stage, 109 Form Two students enrolled in General Science, Agricultural Science, and Technical programmes were selected through simple random sampling. The sample size was determined using the Krejcie and Morgan sample size determination table.

3.5 Research Instrument

Data were collected using the Factors Influencing STEM Career Choice Questionnaire (FISCCQ), which was self-developed based on the constructs of the Social Cognitive Career Theory (SCCT). The questionnaire comprised 27 items measured on a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). The instrument consisted of five subscales: STEM self-efficacy (5 items, $\alpha = 0.63$), outcome expectations (5 items, $\alpha = 0.836$), environmental supports and barriers (7 items, $\alpha = 0.494$), STEM interest (5 items, $\alpha = 0.841$), and STEM career choice (5 items, $\alpha = 0.851$). The overall reliability coefficient of the instrument was $\alpha = 0.89$. Negatively worded items were reverse-coded before analysis so that higher scores consistently represented stronger agreement with the construct being measured.

3.6 Validity of the Instrument

Content validity was established through expert review (Kimberlin & Winterstein, 2008). The questionnaire was evaluated by experts in STEM Education. Their comments and recommendations were incorporated to improve the clarity, relevance, and appropriateness of the items. Face validity was further established by administering the questionnaire to a small group of senior high school students who were not included in the main study to ensure that the items were clear, understandable, and suitable for the target population. In addition, the questionnaire items were developed to align closely with the constructs of the Social Cognitive Career Theory, thereby supporting its construct validity.

3.7 Reliability of the Instrument

A pilot study was conducted with students not included in the final sample to assess the instrument's internal consistency. Cronbach's alpha coefficients were computed for each construct and for the overall questionnaire. The overall reliability coefficient obtained was 0.89, indicating high internal consistency (Dorsah, 2026). The reliability coefficients for the individual subscales were 0.63 for STEM self-efficacy, 0.836 for outcome expectations, 0.494 for environmental supports and barriers, 0.841 for STEM interest, and 0.851 for STEM career choice.

3.8 Data Collection Procedure

The researcher obtained ethical approval and an introductory letter from the Department of Science Education, School of Education, before data collection. The researcher then obtained permission to conduct the study from the authorities of the selected schools. The researcher personally administered the questionnaires to the selected students during regular school hours. Participants were informed of the purpose of the study and provided with clear instructions on how to complete the questionnaire. They were encouraged to respond independently and honestly without external influence. Completion of the questionnaire took approximately 15–20 minutes, after which the completed questionnaires were collected immediately to ensure a high response rate.

3.9 Data Analysis

The collected data were coded and analysed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise the demographic characteristics of the respondents and their responses to the SCCT constructs. Multiple regression analysis was subsequently conducted to determine the extent to which STEM self-efficacy, outcome expectations, environmental supports and barriers, and STEM interest predicted students' STEM career choice. Statistical significance was determined at the 0.05 level. Mean scores were interpreted as low (1.00–3), moderate (3.1–3.5), and high (3.6–5.00).

3.9.1 Assumption Testing for Multiple Regression

Before performing Multiple regression analysis, the normality assumption was examined using a histogram and a Normal P–P Plot of the regression standardized residuals. Visual inspection of the histogram (Figure 1) revealed an approximately bell-shaped distribution centred around zero. Similarly, the points on the Normal P–P Plot (Figure 2) closely followed the diagonal line,

indicating that the residuals were approximately normally distributed (Ghasemi & Zahediasl, 2012; Kim, 2019). Consequently, the assumption of normality was deemed satisfactory, supporting the use of multiple linear regression to examine the influence of STEM self-efficacy, STEM outcome expectations, environmental supports and barriers, and STEM interest on students' STEM career aspirations.

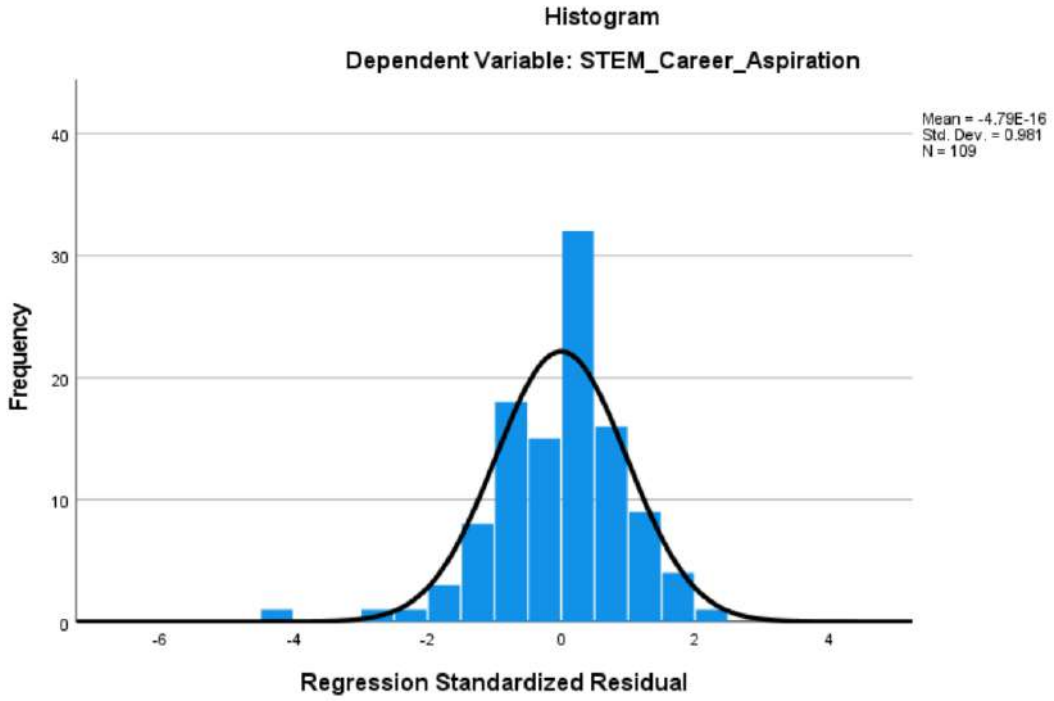

Figure 1: Histogram

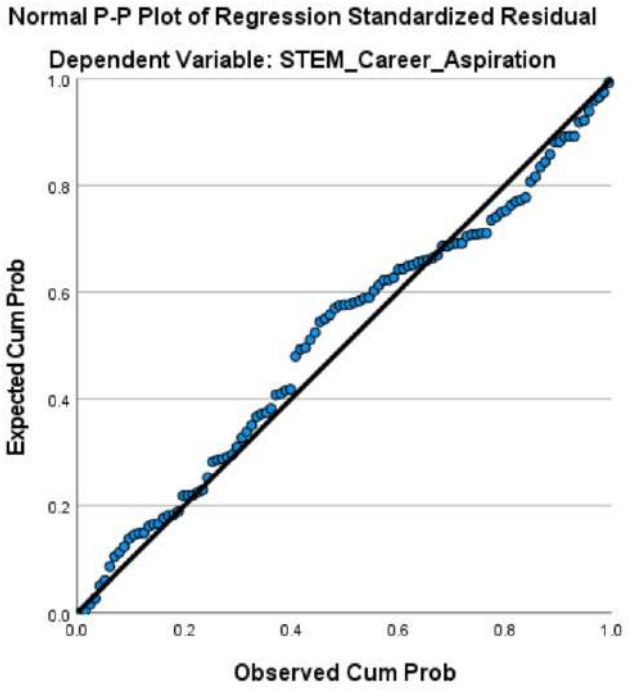

Figure 1: Normal P-P Plot

3.9.2 Independence of Errors Assumption

The assumption of independence of errors was assessed using the Durbin–Watson statistic. The analysis produced a Durbin–Watson value of 1.776, which falls within the commonly accepted range of 1.5 to 2.5, indicating that the residuals were independent and that there was no evidence of significant autocorrelation among the regression errors (Field, 2018; Hair et al., 2019). The obtained value is also close to the ideal value of 2.0, suggesting that the residuals were randomly distributed and that the observations were independent of one another.

3.10 Ethical Considerations

The study adhered to established ethical principles governing educational research. Permission to conduct the study was obtained from the relevant educational authorities and the administrators of the participating schools before data collection commenced. Participation in the study was voluntary, and informed consent was obtained from all participants after they had been adequately informed about the purpose and procedures of the study. Participants were assured that their responses would remain confidential and anonymous, and no personally identifiable information was collected.

4.0 RESULTS

4.1 Demographic Characteristics of Respondents

Table 1 presents the demographic characteristics of the 109 respondents included in the study. The majority of the respondents were male (n = 75, 68.8%), whereas females constituted 31.2% (n = 34) of the sample. Over half of the respondents were aged 18 years and above (n = 55, 50.5%), followed by those aged 16–17 years (n = 51, 46.8%). Only 3 respondents (2.8%) were between 14 and 15 years of age. This distribution indicates that most participants were in the upper age categories of senior high school students. General Science students constituted the largest proportion of the sample (n = 51, 46.8%), followed by Technical students (n = 41, 37.6%) and Agricultural Science students (n = 17, 15.6%). This distribution demonstrates that respondents were drawn from multiple STEM-related programmes.

Table 1: Demographic characteristics of respondents

Sex	*f*	*%*
Male	75	68.8
Female	34	31.2
Total	*109*	*100.0*
Age	*f*	*%*
14-15	3	2.8
16-17	51	46.8
18 and above	55	50.5
Total	*109*	*100.0*
Programme	*f*	*%*
General science	51	46.8
Technical	41	37.6
Agricultural science	17	15.6
Total	*109*	*100.0*

4.2 Research Question 1: What is the level of STEM Career Aspiration among Senior High School students?

Table 2 presents the descriptive statistics for students' STEM career aspirations. The overall mean score for STEM career aspirations was 4.02 (SD = 0.84), indicating that respondents generally exhibited a high level of aspiration toward pursuing STEM-related educational and career pathways. This suggests that the students were positively inclined to pursue STEM careers in the future.

Table 1: Students' STEM career aspirations

s/n	*Statement*	*M*	*SD*
1	I intend to pursue a STEM-related programme after SHS.	3.96	1.13
2	I plan to work in a STEM-related profession in the future.	4.07	1.06
3	I am determined to achieve a STEM career goal.	4.15	0.96
4	I often search for information about STEM careers.	3.78	1.09
5	I would recommend STEM careers to my peers.	4.12	1.07
	STEM Career Aspiration	*4.02*	*0.84*

Among the individual items, the statement, "I am determined to achieve a STEM career goal," recorded the highest mean score (M = 4.15, SD = 0.96), indicating that respondents demonstrated a strong commitment to achieving careers in STEM fields.

This was closely followed by the statement, "I would recommend STEM careers to my peers" (M = 4.12, SD = 1.07), suggesting that students held favourable perceptions of STEM careers and were willing to encourage others to pursue similar career paths. Respondents also agreed that they planned to work in a STEM-related profession in the future (M = 4.07, SD = 1.06), reflecting strong intentions to enter STEM occupations. Similarly, they indicated their intention to pursue a STEM-related programme after Senior High School (M = 3.96, SD = 1.13), demonstrating their commitment to continuing their education in STEM disciplines. The statement, "I often search for information about STEM careers," recorded the lowest mean score (M = 3.78, SD = 1.09).

Although this was the lowest-rated item, the mean remained above the midpoint of the scale, indicating that respondents generally sought information about STEM career opportunities, albeit less frequently than they expressed other aspects of career aspiration. The findings indicate that the respondents possessed high STEM career aspirations. They expressed strong intentions to pursue STEM-related programmes, work in STEM professions, achieve their STEM career goals, seek information about STEM careers, and encourage their peers to consider STEM career pathways. These findings suggest that the students have a strong orientation toward STEM careers.

4.3 Research Question 2: What Is the Level of STEM Self-Efficacy Beliefs Among Senior High School Students?

Table 3 presents the descriptive statistics for students' STEM self-efficacy. The overall mean score for STEM self-efficacy was 3.87 (SD = 0.68), indicating that, on average, respondents agreed that they possessed the confidence and ability required to perform well in STEM-related tasks. This suggests a relatively high level of STEM self-efficacy among the students.

Table 2: Descriptive statistics of Students' STEM Self-efficacy

s/n	*Statement*	*M*	*SD*
1	I am confident in solving mathematics problems.	3.77	1.13
2	I can perform well in science subjects.	3.78	1.03
3	I can successfully carry out science practical activities.	3.72	0.98
4	I believe I can succeed in a STEM-related career.	4.35	0.86
5	I can understand difficult scientific concepts when I try hard.	3.72	1.27
	STEM Self-Efficacy	*3.87*	*0.68*

Among the individual items, the statement, "I believe I can succeed in a STEM-related career," recorded the highest mean score (M = 4.35, SD = 0.86), indicating that students expressed strong confidence in their ability to pursue and succeed in STEM careers. The statement, "I can perform well in science subjects," also received a relatively high level of agreement (M = 3.78, SD = 1.03), followed closely by "I am confident in solving mathematics problems" (M = 3.77, SD = 1.13).
Similarly, respondents agreed that they could successfully carry out science practical activities (M = 3.72, SD = 0.98) and understand difficult scientific concepts when they exert sufficient effort (M = 3.72, SD = 1.27). Although these two items had the lowest mean scores among the five statements, the mean values remained above the midpoint of the scale, indicating generally positive perceptions of their STEM capabilities. The findings suggest that the respondents possessed a high level of STEM self-efficacy, reflecting confidence in their ability to solve mathematical problems, perform well in science, engage in practical scientific activities, understand challenging scientific concepts, and ultimately succeed in STEM-related careers. These results imply that the students perceived themselves as capable of meeting the academic and professional demands associated with STEM disciplines.

4.4 Research Question 3: What Is the Level of STEM Outcome Expectations Among Senior High School Students?

Table 4 presents the descriptive statistics for students' STEM outcome expectations. The overall mean score for STEM outcome expectations was 4.15 (SD = 0.77), indicating that respondents generally agreed that pursuing STEM education and careers would lead to desirable personal, social, and economic outcomes. This suggests that the students held highly positive expectations regarding the benefits associated with STEM careers.

Table 3: Descriptive statistics of Students' STEM outcome expectations

s/n	*Statement*	*M*	*SD*
1	STEM careers provide good employment opportunities.	4.17	1.02
2	STEM careers are financially rewarding.	4.08	0.99
3	Pursuing a STEM career will make me respected in society.	3.90	1.04
4	STEM careers allow people to solve real-world problems.	4.30	0.93
5	Studying STEM subjects can help me achieve my future goals.	4.32	0.96
	STEM Outcome expectation	*4.15*	*0.77*

Among the individual items, the statement, "Studying STEM subjects can help me achieve my future goals," recorded the highest mean score (M = 4.32, SD = 0.96), indicating that students strongly believed that STEM education would contribute to the

attainment of their long-term aspirations. This was closely followed by the statement, "STEM careers allow people to solve real-world problems" (M = 4.30, SD = 0.93), suggesting that respondents recognized the societal value and practical relevance of STEM professions. The statement, "STEM careers provide good employment opportunities," also received a high level of agreement (M = 4.17, SD = 1.02), reflecting students' confidence in the employment prospects associated with STEM fields. Similarly, respondents agreed that "STEM careers are financially rewarding" (M = 4.08, SD = 0.99), indicating that financial benefits were perceived as an important outcome of pursuing STEM careers. The statement, "Pursuing a STEM career will make me respected in society," recorded the lowest mean score (M = 3.90, SD = 1.04). Nevertheless, the mean remained well above the midpoint of the scale, suggesting that students generally believed that STEM careers are associated with social recognition and prestige.

The findings indicate that the respondents possessed strong positive STEM outcome expectations. They believed that STEM careers provide attractive employment opportunities, financial rewards, social recognition, opportunities to address real-world problems, and pathways to achieving their future goals. These positive expectations are likely to enhance students' aspirations to pursue STEM-related careers, consistent with Social Cognitive Career Theory, which posits that favourable outcome expectations play a significant role in shaping career aspirations and choices.

4.5 Research Question 4: What Is the Level of Perceived Environmental Supports and Barriers Among Senior High School Students?

Table 5 presents the descriptive statistics for students' perceptions of environmental supports and barriers related to STEM career aspirations. The overall mean score for environmental supports and barriers was 3.18 (SD = 0.63), indicating that respondents generally perceived a moderately supportive environment for pursuing STEM-related careers. This suggests that while students experienced some forms of support, they also faced barriers that could influence their STEM career aspirations.

Table 4: Descriptive statistics of Environmental supports and barriers in STEM Career choice

s/n	*Statement*	*M*	*SD*
1	My parents encourage me to study STEM subjects.	3.45	1.23
2	My teachers motivate me to pursue STEM careers.	3.84	1.05
3	My school has adequate science laboratory facilities.	3.32	1.29
4	I have access to STEM role models or mentors.	3.17	1.25
5	Financial challenges may prevent me from pursuing a STEM career.	3.26	1.39
6	STEM subjects are too difficult for me.	2.45	1.17
7	Gender stereotypes discourage students from choosing STEM careers.	2.73	1.39
	Environment and Support barriers	*3.18*	*0.63*

Among the individual items, the statement, "My teachers motivate me to pursue STEM careers," recorded the highest mean score (M = 3.84, SD = 1.05), indicating that teachers were perceived as an important source of encouragement for students' STEM aspirations. This was followed by "My parents encourage me to study STEM subjects" (M = 3.45, SD = 1.23), suggesting that parental support also contributed positively to students' interest in STEM careers. Respondents moderately agreed that their schools had adequate science laboratory facilities (M = 3.32, SD = 1.29), although the relatively high standard deviation indicates variation in students' perceptions of the availability of laboratory resources. Similarly, students reported moderate agreement that financial challenges could affect their ability to pursue STEM careers (M = 3.26, SD = 1.39), highlighting financial constraints as a potential barrier.

Access to STEM role models or mentors also received a moderate rating (M = 3.17, SD = 1.25), suggesting that opportunities for mentorship could be strengthened. The statement, "Gender stereotypes discourage students from choosing STEM careers," had a mean score of 2.73 (SD = 1.39), indicating that respondents generally disagreed that gender stereotypes substantially discouraged STEM career aspirations. Likewise, "STEM subjects are too difficult for me" recorded the lowest mean score (M = 2.45, SD = 1.17), suggesting that most students did not perceive the difficulty of STEM subjects as a major obstacle to pursuing STEM careers.

The findings indicate that students perceived their environment as moderately supportive of STEM career aspirations. Teacher and parental encouragement emerged as the strongest sources of support, while access to STEM role models, laboratory facilities, and financial resources represented areas where additional support may be beneficial. Furthermore, respondents generally did not perceive the difficulty of STEM subjects or gender stereotypes as significant barriers to pursuing STEM-related careers. These findings suggest that strengthening environmental supports, particularly through improved school resources, mentorship opportunities, and financial assistance, may further enhance students' aspirations to pursue STEM careers.

4.6 Research Question 5: What Is the Level of STEM Interest Among Senior High School Students?

Table 6 presents the descriptive statistics for students' STEM interest. The overall mean score for STEM interest was 4.12 (SD = 0.82), indicating that respondents generally expressed a high level of interest in STEM-related subjects and activities. This suggests that the students had positive attitudes toward learning STEM and engaging in STEM-related experiences.

Table 5: Descriptive statistics of students' STEM interest

s/n	*Statement*	*M*	*SD*
1	I enjoy learning science subjects.	3.98	1.11
2	I like participating in science practical activities.	4.22	1.02
3	I enjoy solving mathematics problems.	3.86	1.08
4	I am interested in technology and innovation.	4.23	1.06
5	I enjoy learning how things work scientifically.	4.33	1.01
	STEM Interest	*4.12*	*0.82*

Among the individual items, the statement, "I enjoy learning how things work scientifically," recorded the highest mean score (M = 4.33, SD = 1.01), indicating that students were highly interested in understanding scientific principles and phenomena. This was closely followed by "I am interested in technology and innovation" (M = 4.23, SD = 1.06) and "I like participating in science practical activities" (M = 4.22, SD = 1.02), suggesting that respondents were enthusiastic about technological advancements and hands-on scientific learning experiences. The statement, "I enjoy learning science subjects," also received a high level of agreement (M = 3.98, SD = 1.11), reflecting students' positive disposition toward science education. Similarly, respondents agreed that they enjoyed solving mathematics problems (M = 3.86, SD = 1.08), although this item recorded the lowest mean score among the five statements. Nevertheless, the mean remained above the midpoint of the scale, indicating that students generally had a favourable attitude toward mathematics.

The findings indicate that the respondents possessed a high level of STEM interest. They enjoyed learning science, participating in practical activities, solving mathematical problems, exploring technology and innovation, and understanding scientific concepts. These results suggest that the students' strong interest in STEM may positively influence their aspirations to pursue STEM-related careers, as interest is a key motivational factor in career development and decision-making.

4.7 Research Question 6: To What Extent Do STEM Self-Efficacy Beliefs, STEM Outcome Expectations, Perceived Environmental Supports and Barriers, And STEM Interest Predict Senior High School Students' STEM Career Aspirations?

A multiple regression analysis was conducted to examine whether STEM interest, STEM self-efficacy, STEM outcome expectations, and environment/support barriers predicted STEM career aspirations. The overall regression model was statistically significant, $F(4, 104) = 30.05$, $p < .001$, indicating that the predictors collectively explained a substantial proportion of variance in STEM career aspiration. The model accounted for approximately 53.6% of the variance ($R^2 = .536$, Adjusted $R^2 = .518$). The Durbin-Watson statistic (1.776) suggested no serious autocorrelation in the residuals.

Examining the individual predictors, STEM outcome expectation ($\beta = .419$, $p < .001$) and STEM interest ($\beta = .396$, $p < .001$) emerged as significant positive predictors of STEM career aspiration. In contrast, STEM self-efficacy ($\beta = -.143$, $p = .078$) and environment/support barriers ($\beta = .118$, $p = .132$) were not statistically significant predictors. These findings suggest that students' expectations of positive outcomes from STEM careers and their interest in STEM are the strongest drivers of career aspiration. Self-efficacy and environmental/support barriers, while conceptually relevant, did not significantly contribute to predicting STEM career aspiration in this sample. The regression equation was: STEM Career Aspiration = 0.628 – 0.178(STEM Self-Efficacy) + 0.459(STEM Outcome Expectation) + 0.158(Environment/Support Barriers) + 0.405(STEM Interest).

Table 6: Model Summary for Multiple Regression Predicting STEM Career Aspirations

Model	*R*	R^2	Adjusted R^2	SE of the Estimate	Durbin–Watson
1	0.732	0.536	0.518	0.584	1.776

Table 7: ANOVA for the Multiple Regression Model Predicting STEM Career Aspirations

Source	SS	df	MS	*F*	*p*
Regression	41.05	4	10.262	30.05	< .001
Residual	35.52	104	0.342		
Total	76.57	108			

Table 8: Multiple Regression Coefficients Predicting STEM Career Aspirations

Predictor	B	SE B	β	*t*	*p*
Constant	0.628	0.409	—	1.534	0.128
STEM self-efficacy	-0.178	0.1	-0.143	-1.782	0.078
STEM outcome expectations	0.459	0.1	0.419	4.569	< .001**
Environment and support barriers	0.158	0.104	0.118	1.516	0.132
STEM interest	0.405	0.094	0.396	4.321	< .001**

4.8 Discussion

The study found that Senior High School students exhibited a high level of STEM career aspirations (M = 4.02, SD = 0.84). The majority of respondents (91.7%) had considered pursuing a STEM-related career, suggesting that students generally possess positive aspirations towards STEM professions. This finding is consistent with Rafanan et al. (2020), who found that students' decisions to pursue STEM were largely driven by their personal aspirations and alignment with future career goals. Similarly, Pagkratidou et al. (2025) reported that students with stronger science interest and motivation were more likely to expect careers in STEM fields. The finding also supports Rosenzweig and Chen (2023), who concluded that students are attracted to STEM careers because of their perceived utility and attainment value. The high level of career aspirations observed in this study suggests that Senior High School students recognize STEM careers as desirable pathways for future education and employment.

The findings revealed that students demonstrated a high level of STEM self-efficacy (M = 3.87, SD = 0.68), indicating confidence in their ability to perform STEM-related tasks and succeed in STEM careers. This finding agrees with Chen et al. (2022), who reported that STEM self-efficacy significantly enhanced students' STEM aspirations. Likewise, Goldstein et al. (2026) found that participation in robotics programmes strengthened students' STEM self-efficacy through mastery experiences and mentorship. The finding is also supported by Li et al. (2021) and Li et al. (2026), who identified self-efficacy as an important personal factor influencing STEM educational and career decisions. From the perspective of Social Cognitive Career Theory (SCCT), students with stronger self-efficacy beliefs are more likely to engage in STEM learning activities and consider STEM careers.

The respondents reported a high level of STEM outcome expectations (M = 4.15, SD = 0.77), indicating that they believed STEM careers offer desirable outcomes such as employment opportunities, financial rewards, opportunities to solve societal problems, and the achievement of future goals. This finding supports Badmus and Jita (2023), who found that career outcome expectancy was the strongest determinant of STEM career choice among Nigerian undergraduates. It also agrees with Dutta et al. (2015) and Li et al. (2021), who identified outcome expectations as one of the key SCCT variables influencing STEM career decisions. Furthermore, Jiang et al. (2024) demonstrated that career awareness influences STEM interest through outcome expectations, while Madad et al. (2026) reported that positive perceptions of STEM careers significantly predicted students' career aspirations. The findings reinforce SCCT's proposition that individuals are more likely to pursue careers they expect will lead to valued outcomes.

The study found that students perceived a moderately supportive STEM environment (M = 3.18, SD = 0.63). Teacher encouragement and parental support were identified as the strongest sources of support, whereas access to STEM mentors and financial challenges were perceived as moderate barriers. These findings are consistent with Awoniyi and Jokotagba (2025), who found that parental involvement, career counselling, and role models significantly predicted girls' STEM career choices in Ghana. Similarly, Iroaganachi et al. (2021) reported that teachers, parents, and role models significantly influenced girls' STEM career intentions. The findings also support Kanyuma et al. (2025), who concluded that parents strongly shape students' STEM career choices and their access to career guidance. Likewise, Li et al. (2021) and Li et al. (2026) emphasized that contextual supports, including family, teachers, and learning opportunities, influence students' STEM career development. These findings highlight the importance of supportive educational and family environments in fostering students' STEM aspirations.

The findings showed that respondents exhibited a high level of STEM interest (M = 4.12, SD = 0.82). Students particularly enjoyed learning how scientific phenomena work, participating in practical activities, and exploring technology and innovation. This finding aligns with Bahr et al. (2025), who found that interest and academic self-concept were the strongest predictors of STEM educational choices. Similarly, Hatisaru (2021) identified interest as one of the strongest determinants of STEM career intentions. The finding is further supported by Dökme and Hancıoğlu (2025), who reported that participation in robotics-based STEM programmes significantly increased students' STEM career interest. Likewise, Drymiotou et al. (2021) demonstrated that career-based learning activities enhanced students' situational interest in science, while Park et al. (2025) found that intrinsic motivation significantly predicted STEM interest. These findings suggest that cultivating students' interest through engaging STEM learning experiences may strengthen their aspirations to pursue STEM careers.

The multiple regression analysis showed that the four predictor variables collectively explained 53.6% of the variance in STEM career aspirations ($R^2 = .536$), indicating that the model had substantial explanatory power. However, only STEM outcome

expectations and STEM interest emerged as significant predictors of STEM career aspirations, whereas STEM self-efficacy and perceived environmental supports and barriers did not make significant unique contributions after controlling for the other variables. The finding that STEM outcome expectations significantly predicted STEM career aspirations is consistent with Badmus and Jita (2023), who identified outcome expectancy as the strongest predictor of STEM career choice. It also supports Dutta et al. (2015), Li et al. (2021), and Madad et al. (2026), all of whom reported that students who anticipate positive educational and occupational outcomes are more likely to aspire to STEM careers.

Similarly, the finding that STEM interest significantly predicted STEM career aspirations agrees with Bahr et al. (2025), Hatisaru (2021), Pagkratidou et al. (2025), and Park et al. (2025), all of whom found that interest is one of the strongest determinants of students' STEM educational and career choices. These studies consistently show that students who enjoy STEM learning and perceive STEM as engaging are more likely to aspire to STEM careers. Contrary to expectations, STEM self-efficacy was not a significant predictor after controlling for the other variables. This finding corroborates Batul et al. (2026), who similarly found that self-efficacy did not significantly predict STEM interest among Ghanaian adolescents. However, it contrasts with Chen et al. (2022), Dutta et al. (2015), and Li et al. (2021), who reported significant positive effects of self-efficacy on STEM aspirations. A possible explanation is that the influence of self-efficacy may operate indirectly through outcome expectations or interest, as proposed by SCCT.

Likewise, perceived environmental supports and barriers did not significantly predict STEM career aspirations after accounting for the other variables. This finding differs from Awoniyi and Jokotagba (2025), Iroaganachi et al. (2021), and Kanyuma et al. (2025), who found that parental support, teacher encouragement, career counselling, and role models significantly influenced STEM career choices. One possible explanation is that although environmental factors are important in shaping students' experiences, their effects may be mediated through personal factors such as interest and outcome expectations rather than exerting a direct influence on career aspirations.

5.0 CONCLUSION

Senior High School students generally possess positive orientations towards STEM careers and demonstrate strong aspirations to pursue STEM-related educational and occupational pathways. Students' confidence in their STEM abilities, positive expectations regarding STEM career outcomes, supportive learning environments, and interest in STEM disciplines collectively contribute to the development of STEM career aspirations. However, the findings indicate that STEM outcome expectations and STEM interest play the most critical roles in predicting students' STEM career aspirations. This suggests that students are more likely to pursue STEM careers when they perceive such careers as valuable, rewarding, and aligned with their personal interests. Although self-efficacy and environmental support are important components of STEM career development, they may not independently influence career aspirations unless students develop strong interest and perceive meaningful future benefits associated with STEM professions.

The study therefore highlights the importance of creating learning experiences and career development initiatives that enhance students' interest in STEM and provide clear information about the opportunities and benefits associated with STEM careers. Strengthening students' engagement with STEM disciplines, improving exposure to STEM professionals, and providing supportive learning environments are essential for encouraging sustained participation in STEM fields.

Based on the findings of the study, schools should provide structured STEM career guidance programmes that expose students to diverse STEM career pathways, employment opportunities, and the contributions of STEM professionals to society. Such programmes should help students develop realistic and positive expectations about STEM careers. Science, mathematics, and technology teachers should employ innovative and learner-centred teaching approaches, such as inquiry-based learning, project-based learning, and practical activities, to enhance students' interest and engagement in STEM subjects. Real-world applications of STEM concepts should be emphasised to demonstrate the relevance of STEM knowledge beyond the classroom.

Schools should establish mentorship programmes that connect students with STEM professionals, researchers, engineers, and other practitioners.

Interaction with role models can help students understand STEM career opportunities and strengthen their motivation to pursue STEM pathways. Educational stakeholders should invest in science laboratories, technological resources, and practical learning materials to provide students with meaningful STEM learning experiences. Improved facilities may enhance students' engagement and reinforce their interest in STEM disciplines. Parents and community stakeholders should be encouraged to support students' STEM aspirations through motivation, career discussions, and provision of learning opportunities. Schools should create awareness programmes to help parents understand the importance of STEM careers. Policymakers and educational authorities should develop scholarship schemes, financial assistance programmes, and other support mechanisms to enable students from economically disadvantaged backgrounds to access STEM education and career opportunities. STEM career awareness should be incorporated into Senior High School teaching and learning activities. Subject teachers should link classroom content with potential STEM careers to help students understand how their learning connects to future professional opportunities.

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