

# Factors Influencing the Decrease in the Choice of Engineering as a Career among Students at the Bong County Technical College, Bong County, Liberia

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## Abstract

This study investigates the factors influencing the decrease in the choice of engineering as a career among students at the Bong County Technical College, Liberia. Acknowledging the essential role of engineering in addressing global challenges and promoting economic development, the research highlights the need to critically assess students' perceptions of engineering. Using a cross-sectional research design, quantitative data were collected from 66 students, representing 10.8% of the total student population. The findings indicate that personal interest, parental influence, and career counseling significantly shape students' career decisions. While a majority of respondents (53.1%) believe job prospects for engineering graduates are favorable, many reported a lack of foundational knowledge in key subjects such as math, chemistry, and physics, which is linked to inadequate high school guidance—66.6% felt uninformed about their career options. Parental support was also significant, with 57.5% of students receiving encouragement for their chosen fields. Despite attending career workshops, many students expressed dissatisfaction with the quality of career counseling, revealing critical gaps in support and information. To address these challenges, the study recommends enhancing high school curricula, improving career counseling services, increasing parental involvement, and establishing mentorship programs. By implementing these strategies, educational institutions can better prepare students for successful careers in engineering, ultimately strengthening Liberia's workforce.

**Key words:** Bong County Technical College, career students, choice of engineering, decrease, Factors

## INTRODUCTION

Engineering is the basis for technological advancement and economic growth, development, and sustainability of a society. According to Truslove et al., (2022), the urgent global challenges facing people and the planet mean a critical reflection of how engineering is practiced, and is needed now. The choice of engineering as a career is adventitious, in undeveloped countries like Liberia, for infrastructural growth and development, and economic improvement. The choice of engineering as a career and a degree program requires students' critical and analytical problem-solving skills which are determined from scientific concepts build in the studies of mathematics, physics, chemistry, etc.

The Bong County Technical College (BCTC) was created by an Act of the National Legislature of Liberia on July 29, 2015 as a four (4) year degree granting institution of higher learning. BCTC presently runs five (5) programs in Agricultural Technology, Education (Secondary Science and Primary), Engineering (Civil and Mining), Health Sciences (Nursing), and Information Technology. The BCTC is located in the Gboveh Hill Community, Gbarnga City, Bong County, central Liberia. BCTC serves Bong County and its surrounding counties as an intellectual, technical, economic, and cultural center. It provides quality undergraduate studies in technical disciplines and professional education within a dynamic central environment, while embracing diversity and actively engaging students in their academic, personal, and professional development. Engineering being one of the degree programs of the college, which comprises of

Civil and Mining divisions, has been low enrolled since the establishment of the institution. Hence, factors influencing the decrease in students' choice of engineering as a career in the central region of the country-Liberia need to be unearthed.

Engineering profession is one of the primary players in this twenty-first century. It is a unique profession that is involve with upgrading our society thus making living easier. According to Engineers Without Borders UK (2022) report, engineers play an essential role in shaping humanity's interactions with the world around us. As a profession that has the power to transform the world for the better, engineers are uniquely placed to tackle global challenges, improve quality of life, protect the environment, and increase our resilience to risk. The report further noted that, engineering has played a vital role in contributing to the unjust and unsustainable practices that dominate the world today. Evidence has shown that human development and the advancement of technologies are directly linked to increasing carbon emissions, biodiversity loss, and human elimination. As a result, we are now faced with the reality that our current way of life cannot be sustained for generations to come without critical attention to the current global threat, Engineers Without Borders UK. (2022). Due to the numerous tasks of engineers, especially in this twenty-first century, there is a need to have more trained engineers to solve society's problems.

According to Lightcast for Engineering UK (2023), on average, the range of skills demanded by employers is becoming increasingly diverse across the engineering trail. This proposes that the engineering profession is becoming wider, with extensive application of engineering principles across the economy. Looking specifically at specialized engineering skills, it reveals that skills and knowledge relating to specific disciplines, including mechanical, electrical, and civil engineering, are amongst the most required by employers. More cross-cutting engineering skills, such as technical drawing and computer-aided design, engineering management practices, and automation engineering, are also highly sought after, Lightcast for Engineering UK (2023).

Moreover, vigorous science, technology, engineering, and mathematics (STEM) education is becoming more and more important to our economy and our society at large. Employment in STEM careers is expected to grow 8.8% by 2028, which generally requires a strong STEM background. Meanwhile, non-STEM occupations will only grow by 5%, Yeti Academic (2023). They added that STEM education doesn't only help students who plan to go into STEM careers. It focuses on logical thought processes and problem-solving skills that allow students to develop mental habits that will help them succeed in any other field of study. This shows that STEM education is the gateway to a successful career path. STEM coursework challenges students to think critically and come up with their critical solutions. As a result, students who receive a quality STEM education are well-informed to become the next generation of innovators (Yeti Academic, 2023). As stated in Badmus et al., (2022), STEM students' career success expectations are significantly predicted by their self-efficiency in making career decisions (Baglama and Uzunboylu, 2017; Mau et al., 2021; and Peña-Calvo et al., 2016). Self-efficiency is a critical aspect of individual self-growth; a student who believes in achieving something will always get up and go for success.

Furthermore, interest plays a critical role in determining career choice. As stated in Badmus et al., (2022), exposure to STEM activities, the experience of learners in and outside the school, and performance in difficult STEM subjects were gainful links of interest development to study STEM fields. Moreover, the study revealed that interest was higher among students from low-income families, which is a pointer to career outcome expectancy for poverty alleviation and economic balance. However, parental education was associated with the decision to continue studying STEM after secondary school but not in a particular field. The study concluded that career outcome expectancy and self-efficacy contribute more to students' development of interest in studying STEM-related courses in higher institutions Mitsopoulou and Pavlatou, (2021). Moreover, the social cognitive career theory (SCCT) of Lent et al. (2008), as adopted by Badmus et al. (2022), contributes to the way academic and career interests are developed through educational and career choices. Interest plays a key role when it comes to career attainment. With SCCT, the learner's behavior is regarded as a co-modifier of the society based on the triadic reciprocal interconnection model. This theory postulates that the purpose of choosing a career is based on beliefs related to self-efficacy, outcome expectations, and goal-related beliefs. In addition, interest can also influence career decisions.

In addition, a study conducted by Disha et al. (2023) results showed that the parental general psychosocial support was a statistically important factor in predicting career decision-making and self-efficacy, explaining the alteration of this concept for college students, and results reflected that there was a negative

correlation of family influence on students. Similarly, a study conducted by Audu et al. (2024) disclosed that parental influence was high, and the finding of the research hypothesis revealed that there was a significant relationship between parental influence and students' career choices. In addition, as stated in Disha et al., (2023), adolescents valued parental influence and guidance in the area of career choice and vocational development. Parents need to give students supports and encouragement to explore many options available to find the best career that pleased them. It is best to start the discussion as early as possible. Much of the formative way of discussion must have happened before this stage. If this process is started earlier, there is less likelihood of making unwise decisions, Bregman and Killen (1999). On the other hand, a study conducted by Koçak et al. (2021) findings shows that family influence and academic satisfaction were positively correlated with career decision self-efficacy and happiness. Additionally, they found that family influence and support, students' work, and academic satisfaction are positively significant in terms of the career process and happiness. It was understood that the career reality should be considered with a holistic view that includes family, school, and work experience. This shows that the career success of a student depends on all educational stakeholders.

As stated in Migunde (2021), career counseling, also known as career guidance, is counseling designed to help students choose, change, or leave a career. Career counseling was initiated in the United States in the 19<sup>th</sup> century by Frank Parson. Its primary focus was job placement. Parson's career counseling model was grounded in sample logic and common sense and relied on the observing and interviewing skills of the counselor. He inscribed that effective career placement required knowledge of the special talents of the worker, the requirements of various occupations, and the relationship between these sets of knowledge (Pop, 2000). This shows that all career counselors should possess thorough knowledge to execute his or her assigned tasks. According to Rukew and Oats (2020), the absence of career guidance in schools is termed as lamentable upshot. They found that due to this condition in most schools, the majority of the students did not have enough career information as expected of students at their final stage of secondary education. They added that career information did not seem to be accorded the significance it deserved as career guidance was not offered in most schools. Moreover, schools with career guidance units, their programs, initiatives, and practices were inadequate to meet the needs of the students. Similarly, a study conducted by Miginde (2021) findings shows that going for career counseling was not effective in students' career development. There was no significant difference between those who had gone for career counseling and those who had not for all the measured variables. This implies that the kind of career counseling students undergo does not provide them with comprehensive career-related information.

Over the past years, BCTC has served as an intellectual, technical, economic, and cultural center for students of Bong County and its surrounding counties. With the influx of students, there has been a growing concern as to why the Engineering Department remains low enrolled since the establishment of the institution. There is a need to establish the factors responsible for the low enrollment of students in the Engineering Department at the BCTC. Therefore, this study's purpose is to examine the key factors influencing the decrease in the choice of engineering as a career by critically focusing on assessing non-engineering students' perceptions of engineering careers, factors influencing students' career choices, and impacts of parents and career counselors.

## **METHODOLOGY**

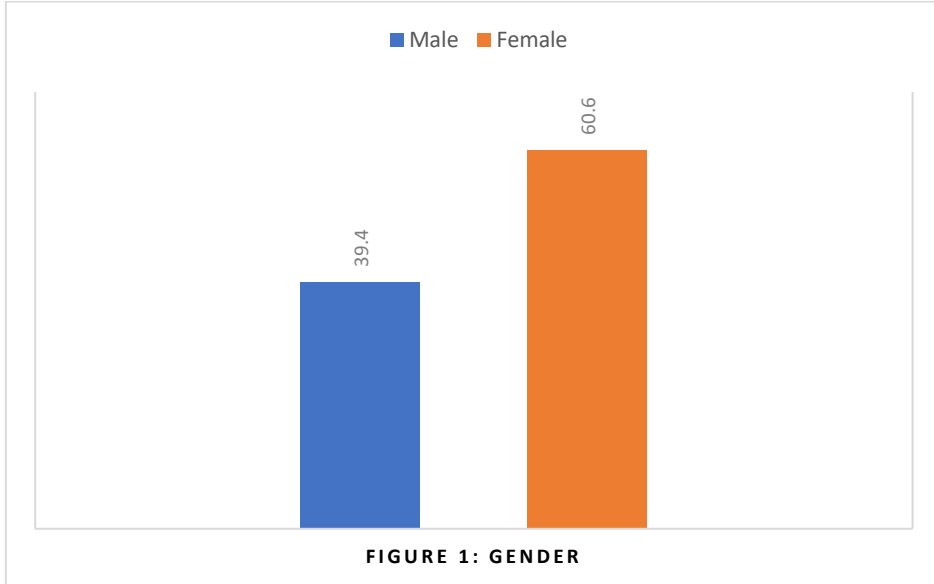
This study employed a cross-sectional research design to collect quantitative data. Quantitative research design is used to gather, analyze, and interpret numerical data to understand patterns, relationships, or phenomena and uses statistical methods to make predictions. The target population for this study included all students enrolled at the Bong County Technical College. The population of the study was 611 students enrolled at the time of the study. The sample size was selected based on Mugenda and Mugenda's (2003) sample selection. As stated in Makworo (2020), according to Kothari (2004), an optimum sample fulfills the requirements of efficiency, representativeness, reliability, and flexibility. This sample should be in the range of 10%-30% (Mugenda and Mugenda, 2003). Using this method, a total of sixty-six (66) students, representing 10.8% enrolled at the Bong County Technical College, were selected as a sample for this research. The convenience sampling method was used to select the sample for this study. Data was collected from both primary and secondary sources. The instrument for data collection was a questionnaire that was developed by the researcher to collect primary data. Desktop reviews from media and college records

sources (admission records, journal articles, and internet formulated) were used to collect secondary data. The data from the questionnaires was analyzed using both descriptive statistics (frequencies, percentages, etc.) and inferential statistics (making predictions).

**RESULTS**

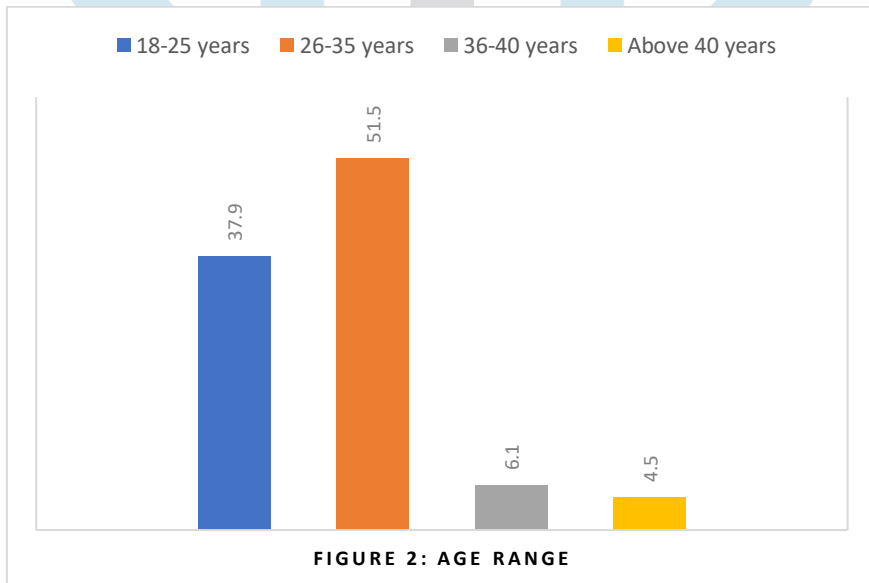
**Demographic Information of Respondents**

The charts below describe the demographic information of respondents, which targeted gender, age range, status, and major.



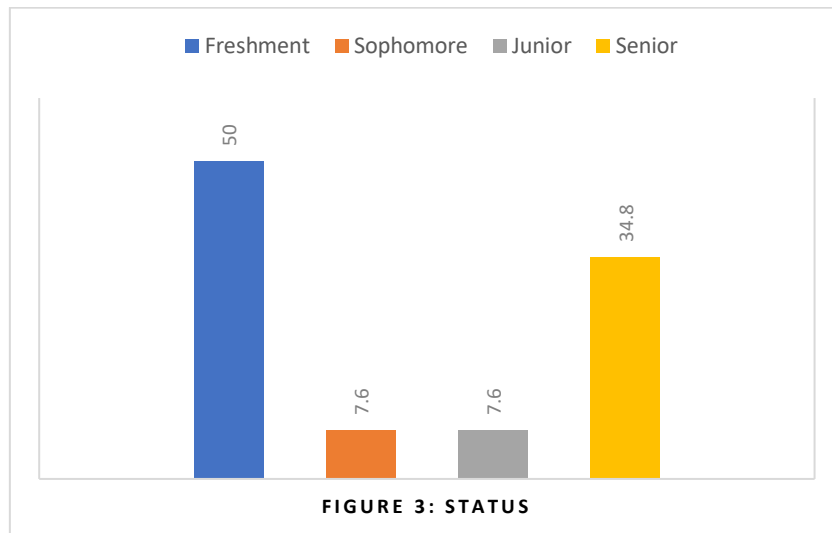
Source: Field Survey, 2024

Figure 1 shows that 39.6% of the respondents were male while 60.6% were female. This indicates that the majority of the respondents were female.



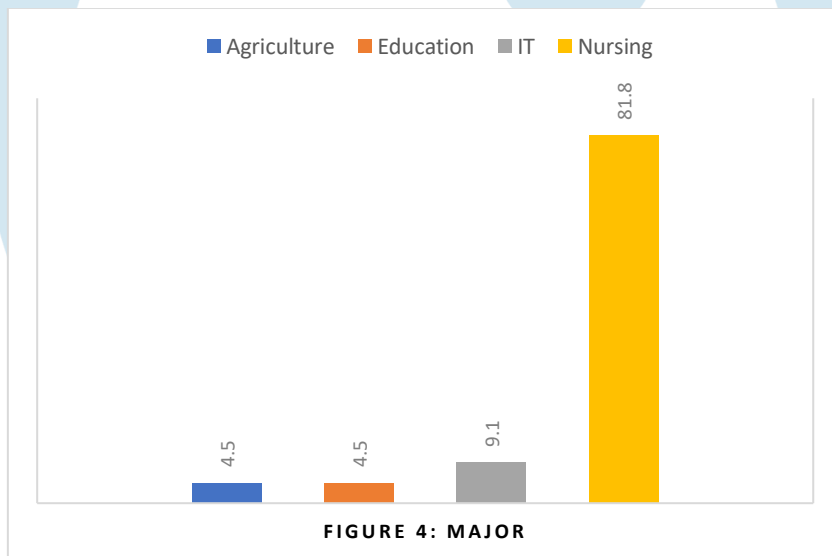
Field Survey, 2024

Figure 2 shows that 39.9% of the respondents aged between 18-25 years, 51.5% aged between 26-35 years, 6.1% aged between 36-40 years, and a minimum of 4.5% age above 40 years. This indicates that the majority of the respondents were aged between 26-35 years.



Source: Field Survey, 2024

Figure 3 shows that 50% of the respondents were freshmen students, 7.6% were sophomore students, 7.6% were also junior students, and 34.8% were senior students. This indicates that the majority of the respondents were freshman and senior students.



Source: Field Survey, 2024

Figure 4.5 shows that 4.5% of the respondents were Agriculture major students, 4.5% were also Education majors, 9.1% were IT majors, and 81.8% were Nursing majors. This indicates that the majority of the respondents were Nursing major students. This further revealed that there may be more Nursing major students enrolled in BCTC than in the other disciplines.

Table 1: Presentation According to Factors Influencing Career Choice

Coefficient	Estimate	Standard Error	t-Statistic	P-value	95% Confidence Interval
Intercept	0.45	0.10	4.50	0.001	(0.25, 0.65)
Gender	0.25	0.15	1.67	0.120	(-0.05, 0.55)
Age 18 - 25	-0.20	0.12	-1.67	0.120	(-0.44, 0.04)
Age 26 - 35	0.30	0.13	2.31	0.024	(0.04, 0.56)
Age 36 - 40	-0.10	0.20	-0.50	0.635	(-0.54, 0.34)

<b>Age Above 40</b>	-0.40	0.25	-1.60	0.115	(-0.91, 0.11)
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**Source: Field Survey, 2024 (\*P < 10% significant level)**

Table 1 helps to identify which demographic factors (gender and age) might influence the choice of a career. Overall, the results highlight the importance of age, particularly the 26-35 age group which shows the likelihood of Nursing as a career choice, while indicating that gender and the other age categories (18-25, 36-40, and above 40) do not significantly contribute to the model.

### Responses of respondents

The main objective of this study is to examine the key factors influencing the decrease in the choice of engineering as a career by critically focusing on assessing non-engineering students' perceptions of engineering careers, factors influencing students' career choices, and impacts of parents and career counselors. The responses are summarized in the below tables:

**Table 2: Responses of Respondents to the Statement: "A graduate with an engineering degree hardly finds a job in Liberia."**

Category of responses	Frequency	Percentage
Agree	15	22.7
Strongly Agree	16	24.2
Disagree	18	27.3
Strongly Disagree	17	25.8
Total	66	100

**Source: Field Survey, 2024**

Table 2 shows that 22.7% of the respondents agreed that a graduate with an engineering degree hardly finds a job in Liberia, 24.2% strongly agreed, 27.3% disagreed, and 25.8% strongly disagreed.

**Table 3: Responses of Respondents to the Statement: "Engineering students deal with tough math, chemistry, and physics courses."**

Category of responses	Frequency	Percentage
Agree	37	56.1
Strongly Agree	23	34.8
Disagree	3	4.5
Strongly Disagree	3	4.5
Total	66	99.9

**Source: Field Survey, 2024**

Table 3 shows that 56.1% of the respondents agreed that engineering students deal with tough math, chemistry, and physics courses, 34.8% strongly agreed, 4.5% disagreed, and 4.5% strongly disagreed.

**Table 4: Responses of Respondents to the Statement: "I don't have a strong math, chemistry, and physics background."**

Category of responses	Frequency	Percentage
Agree	25	37.9
Strongly Agree	10	15.2
Disagree	22	33.3
Strongly Disagree	9	13.6
Total	66	100

**Source: Field Survey, 2024**

Table 4 shows that 37.9 of the respondents agreed that they don't have a strong math, chemistry, and physics background, 15.2% strongly agreed, 33.3% disagreed, and 13.6% strongly disagreed.

**Table 5: Responses of Respondents to the Statement: “I have never thought of reading engineering from my high school days.”**

Category of responses	Frequency	Percentage
Agree	28	42.4
Strongly Agree	14	21.2
Disagree	15	22.7
Strongly Disagree	9	13.6
Total	66	99.9

**Source: Field Survey, 2024**

Table 5 shows that 42.2% of the respondents agreed that they had never thought of reading engineering from their high school days, 21.2% strongly agreed, 22.7% disagreed, and 13.6% strongly disagreed.

**Table 6: Responses of Respondents to the Statement: “I was advised by my parent to join the discipline I am currently reading at BCTC.”**

Category of responses	Frequency	Percentage
Agree	23	34.8
Strongly Agree	15	22.7
Disagree	20	30.3
Strongly Disagree	8	12.1
Total	66	99.9

**Source: Field Survey, 2024**

Table 6 shows that 34.8% of the respondents agreed that they were advised by their parents to join the discipline they are currently reading at BCTC, 22.7% strongly agreed, 30.3% disagreed, and 12.1% strongly disagreed.

**Table 7: Responses of Respondents to the Statement: “I was discouraged by the choice of engineering as a result of the engineering program structure at BCTC.”**

Category of responses	Frequency	Percentage
Agree	11	16.7
Strongly Agree	14	21.2
Disagree	33	50.0
Strongly Disagree	8	12.1
Total	66	100

**Source: Field Survey, 2024**

Table 7 shows that 16.7% of the respondents agreed that they were discouraged by the choice of engineering as a result of the engineering program structure at BCTC, 21.2% strongly agreed, 50.0% disagreed, and 12.1% strongly disagreed.

**Table 8: Responses of Respondents to the Statement: “There is a guidance and counseling department in my high school.”**

Category of responses	Frequency	Percentage
Agree	15	22.7
Strongly Agree	14	21.2
Disagree	28	42.4
Strongly Disagree	9	13.6
Total	66	99.9

**Source: Field Survey, 2024**

Table 8 shows that 22.7% of the respondents agreed that there is a guidance and counseling department in their high schools, 21.2% strongly agreed, 42.4% disagreed, and 13.6% strongly disagreed.

**Table 9: Responses of Respondents to the Statement: “I was always informed about my career choice by my career counselor.”**

Category of responses	Frequency	Percentage
Agree	10	15.2
Strongly Agree	12	18.2
Disagree	29	43.9
Strongly Disagree	15	22.7
Total	66	100

**Source: Field Survey, 2024**

Table 9 shows that 15.2% of the respondents agreed that they were always informed about their career choice by their career counselor, 18.2% strongly agreed, 43.9% disagreed, and 22.7% strongly disagreed.

**Table 10: Responses of Respondents to the Statement: “I attended several career workshops during my high school days.”**

Category of responses	Frequency	Percentage
Agree	26	39.4
Strongly Agree	13	19.7
Disagree	11	16.7
Strongly Disagree	16	24.2
Total	66	100

**Source: Field Survey, 2024**

Table 10 shows that 39.4% of the respondents agreed that they attended several career workshops during their high school days, 19.7% strongly agreed, 16.7% disagreed, and 24.2% strongly disagreed.

## DISCUSSION OF KEY FINDINGS

From the study findings, it was revealed that the majority of the respondents (53.1) disagreed and strongly disagreed that a graduate with an engineering degree hardly finds a job in Liberia. That opposes the finding of Mitsopoulou and Pavlatou (2021), who reported that career outcome expectancy contributes more to students' development of interest in studying STEM-related courses in higher institutions. However, the vast majority of the respondents (90.9%) agreed and strongly agreed that engineering students deal with tough math, chemistry, and physics courses. In addition, the majority of the respondents (53.1%) agreed and strongly agreed that they don't have a strong math, chemistry, and physics background, and 63.4% of the respondents agreed and strongly agreed that they had never thought of reading engineering from their high school days. This shows that students had not developed interests in the engineering fields. As the social cognitive career theory predicted, interests play crucial roles in career choice determination. This agrees with the finding of Badmus et al. (2022), who exhumed that exposure to STEM activities, experience of learners in and outside the school, and performance in difficult STEM subjects were gainful links to interest development of study in STEM fields.

Out of the total respondents, 57.5% of the respondents agreed and strongly agreed that they were advised by their parents to join the discipline they are currently reading at BCTC. This agrees with the finding of Audu et al. (2024), who disclosed that parental influence on students' career choices was high; therefore, there was a significant relationship between parental influence and students' career choices. The majority of the respondents (62.1%) disagreed and strongly disagreed that they were discouraged by the choice of engineering as a result of the engineering program structure at BCTC. On the other hand, the majority of the respondents (56.0%) disagreed and strongly disagreed that there is a guidance and counseling department in their high schools. Meanwhile, 66.6% of the respondents disagreed and strongly disagreed that they were always informed about their career choice by their career counselor. This agrees with the finding of Rekew and Oats (2020) who exposed that students did not have adequate career information as expected of students at their final stage of secondary. Therefore 59.1% of the respondents agreed that they attended several career workshops during their high school days. This shows that there was no effective career workshops as established by the majority of the respondents being influenced by their parents in choosing careers. This also agrees with the finding of Miginde (2021) who exposed that student going for career counseling was

not effective in students' career development. This indicates that the kind of career counseling students undergo does not provide them with comprehensive career-related information.

## CONCLUSION

In conclusion, this study reveals a complex landscape for engineering students in BCTC. While the majority of respondents believe that obtaining an engineering degree does not significantly hinder job prospects, there is a notable concern regarding their preparedness in foundational subjects such as math, chemistry, and physics. The data indicates that many students lacked strong backgrounds in these critical areas, highlighting a potential gap in high school education and guidance.

Furthermore, while parental influence plays a significant role in shaping students' academic paths, there seems to be a disconnect in career counseling at the high school level, with many respondents reporting inadequate support and information regarding their career choices. Despite some engagement in career workshops, a significant portion of students felt uninformed about their options and discouraged from pursuing engineering due to the program's structure at BCTC.

These findings suggest the need for improved guidance and counseling services in high schools, along with enhanced support systems for prospective engineering students at BCTC. By addressing these gaps, educational institutions can better equip students with the necessary skills and confidence to thrive in engineering fields, ultimately contributing to a more robust workforce in Liberia.

## RECOMMENDATIONS

Based on this study findings, the following recommendations are proposed to enhance the educational experience and career readiness of engineering students at BCTC and in Liberia at large:

1. **Strengthen High School Curriculum:** Revise the high school curriculum to place greater emphasis on foundational subjects such as math, chemistry, and physics. This may perhaps include introducing specialized foundation courses that focus on the practical applications of the STEM subjects.
2. **Enhance Career Counseling Services:** Establish or improve dedicated guidance and counseling departments in high schools. Counselors should be trained to provide accurate information about various career paths, including engineering, and help students understand the requirements and expectations of these fields.
3. **Parental Involvement Initiatives:** Develop programs that engage parents in discussions about career choices and the importance of foundational knowledge in STEM subjects. This can help create a supportive home environment that encourages students to pursue engineering.
4. **Targeted Workshops and Seminars:** Organize workshops and seminars focused on engineering careers, where industry professionals can share insights and experiences. These events should also address common fallacies about job prospects and the value of an engineering degree.
5. **Mentorship Programs:** Implement mentorship programs that connect high school students with current engineering students or professionals at BCTC. This will provide students with practical insights and guidance on navigating their academic and career choices.
6. **Feedback Mechanism for Curriculum Improvement:** Establish a feedback mechanism that allows current engineering students to share their experiences regarding the program structure and suggest improvements. This feedback can help educators improve the curriculum to better meet students' needs.
7. **Promote Interdisciplinary Learning:** Encourage interdisciplinary approaches in engineering education that integrate soft skills and real-world problem-solving with technical knowledge, preparing students for diverse challenges in the workforce.
8. **Collaboration with Universities and Industry:** Foster partnerships between high schools, universities, and local industries (ArcelorMittal, MNG Goal, CHICO, etc.) to create pathways for students to gain practical experience and understand the skills required in the engineering field.

Therefore, by implementing these recommendations of this study, educational institutions can better prepare students for successful careers in engineering and help build a stronger workforce in Liberia.

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