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Investigation of factors influencing career choice among STEM undergraduates in Nigeria universities

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Abstract

Shortage of expertise in science, technology, engineering and mathematics (STEM) fields have been reported over the years despite financial and social interventions by government through policies and efforts of stakeholders. Remediating the afore stated requires a retrospection into the factors responsible for learners' choice and career orientation in STEM. As such, this study investigated undergraduates' choice of STEM field and career orientation employing descriptive research. Undergraduates' choice of career questionnaire with interpersonal, intrapersonal and career outcome expectancy components formed the instrument with reliability index of 0.86. Purposive sampling was employed in the selection of 200 undergraduates in STEM related disciplines from public universities in Nigeria. Three research questions were raised to evaluate the extent of agreement and variance to each of the factors while three hypotheses were formulated and tested using one-way ANOVA among undergraduates' choices. From the findings, career outcome expectancy outclassed both interpersonal and intrapersonal factors as reason for career choice. This study recommends that factors considered in this study have the possibility of impacting how institutional policies, educational leaders, and stakeholders determine the kind of support/intervention expected to buffer career choice among STEM students.

Keywords: career orientation, interpersonal, intrapersonal, undergraduates

INTRODUCTION

An interdisciplinary disposition to learning and application of the knowledge of science, technology, engineering and mathematics (STEM) in solving economic, social and political challenges have been embraced world over (Bybee, 2010; Makonye & Dlamini, 2020; Vasques, 2015). A directed and comprehensive approach to teaching and learning to expose and acquire multidisciplinary concepts, competencies, and dispositions in STEM disciplines, as well as its application in both academic and real-life contexts for competitiveness in the 21st century describes STEM field (Tzu-Ling, 2019; Vasques, 2015). The societal demand for technology in all forms and kinds put to rest the debate on the significance of STEM and its education. Advancements experienced from decade to decade owe its depth to the knowledge and application of STEM (Breiner et al., 2012; Nugent et al., 2015; Wang, 2018). Human development in recent time is characterized by globalization, sophistication, and empirical competences stemming from evolution in the primitive basics in STEM (knowledge) handed down from generations (Badmus & Omosewo, 2020; San-Pedro et al., 2019). From the nature (philosophy, sociology, and epistemology) of STEM, it becomes rudimentary for knowledge to be transferred, taking into cognizance certain characteristics required of those acquiring it (Mesci, 2020; Mesci & Schwartz, 2017).

Custodians of STEM knowledge cling to the foundational tentativeness of approaches, processes and pattern dynamics, which makes STEM an open-ended field with emerging areas of knowledge having endless possibilities in scope and direction (Byars-Winston et al., 2010; Makonye & Dlamini, 2020; Mesci & Cobern, 2020). The rationale for knowledge transfer in STEM is imperative. Advancing STEM sub-components owing to the current demand for its graduates who have been

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Contribution to the literature

- Empirically, this study avails the audience the basis for career decision in STEM and establishes the direction of intervention required in policy decision to buffer the shortage experienced in enrollment and performance.
- An updated position is availed on the primary factor responsible for career choice which is expected to guide future studies on sub-component of the factor in question.

deemed inadequate to meet the societal needs in terms of innovation and problem-solving is not out of place (Almeda & Baker, 2020; National Science Board, 2017). Employment in STEM occupations have grown in recent time and still requires a great number of expertise to meet this ever-evolving field. There are growing concerns among policy makers and scholars over limited STEM labor pool towards keeping up with global demand, as well as the need to encourage undergraduates' choice and career orientation in STEM fields (Chen & Chen, 2021; Nasir et al., 2022; Tan et al., 2021). Globally, STEM career orientation, choice and intention vary due to demand and competence (expertise) available to train persons willing to pursue such career (Badmus & Omosewo, 2020; Compeau, 2016).

In the absence of requisite orientation, the possibility that learners will forgo the opportunity of a STEM-based career in the future remains tenable from recent data (Iroaganachi et al., 2021; OECD, 2019a). A growing body of literature have identified peer influence (interaction, counselling, and relationship), parental influence/imposition and performance in subjects as factors, which influence students career choice and orientation (Abdelmelek & Hanani, 2017; Edwards & Quinter, 2011; Miller & Hurlock, 2017; Ugo & Akpoghol, 2016). Career choice and orientation in tertiary institutions have been encouraged to initiate programs, which seeks to entice secondary school students to pursue career in STEM-related fields for engagement in STEM work-pool. Learners develop self-efficacy, work habits, and career explorations at this stage due to external influence (Almeda & Baker, 2020; Bleeker & Jacob, 2019; Kneztek et al., 2013). Parental education and gender (prominent among male) have also been associative factors in the choice and orientation of career in STEM disciplines (Chen & Chen, 2021; Crisp et al., 2009; Vasques, 2015). The choice of career path and decisions of female students that have now culminated into limited subscription into STEM subjects/field may be dependent on female disposition as against competence and ability (Almeda & Baker, 2020; Crisp et al., 2009).

Literature has established causal relationship among awareness, aspiration, and career choice among secondary school students in both home and school as contributory elements in learning and development (Byars-Winston et al., 2010; Kirdök, 2018; Nasir et al., 2022). The role of the environment and even parents are critical to learners' education, career paths as well as socialization (Betz et al., 2020; Heddy & Sinatra, 2017). Parental influence has the possibility of influencing what education and career paths a child undertakes. Responsibility is accorded to parent or guardian with respect to education and career choice as children may rely on affection and financial capacities of their parents in taking this decision. Parental support, encouragement and guidance often spur children's determination to achieve set educational or/and career goals (Zhang et al., 2019). From the foregoing, learning, taking a decision or interest to study STEM would have parents/guardian influence or support (Heddy & Sinatra, 2017; Wang, 2018).

A significant turning point in any student's life is choosing a career (Baglama & Uzunboylu, 2017; Bett, 2013; Edwards & Quinter, 2011). Before making a choice, students must weigh a few aspects. Wrong choice of career may result in several negative outcomes (Heddy & Sinatra, 2017; Iroaganachi et al., 2021). These outcomes may result in creating a misfit workforce who lack productivity, efficiency and even fulfilment. Graduates in the fields of STEM are developing solutions targeted at solving the present-day problems, yet more are in demand over the past few decades (Abe & Chikoko, 2020; Compeau, 2016). Despite growing demand of expertise, research have reported inadequacy in the number of students willing to take up careers in STEM disciplines despite high demand (Byars-Winston et al., 2010; Crisp et al, 2009; Kauffmann et al., 2009). While there are global, national and domestic efforts to encourage students to study STEM related disciplines for over three decades, the projection in terms of expertise have been well speculated and funded to propel emerging learners (Litchtenberger & Casey, 2018; National Science Board, 2017; OECD, 2019b; Peña-Calvo et al., 2016). Governments and stakeholders have budgeted significantly to ensure the gap between demand and supply is remediated with little success on record now (Nasir et al., 2022; Rivera & Li, 2020; Tan et al., 2021).

From the reviewed literature, the decision to study STEM can be categorized into three standout factors. Previous studies with pointers to why and how students choose their course of study are all the direction of interpersonal, intrapersonal and in the career outcome expectancy (Abe & Chikoko, 2020; Almeda & Baker, 2020; Baglama & Uzunboylu, 2017; Blotnicky et al., 2018; Byars-Winston et al., 2020; Crisp et al., 2009; Edward & Quinter, 2011; Iroaganachi et al., 2021; Kauffmann et al., 2009; Kazi & Aklaq, 2017; Kneztek et al., 2013; Lent et al., 2017; Lichtenberger & Casey, 2013; Mau & Li, 2017, Mau et al., 2021). An aggregation of the findings of these studies informed the categorization and formed the basis upon which the instrument was developed for data gathering. Funneling data of this kind may allow for better understanding of factors, which could assist in alleviating the shortage of expertise experienced in STEM fields. In addition, interpersonal factors in this study relate to people and environmental interaction with the decision to study STEM. Components like family influence, peer pressure, teacher's counsel and parent's discipline formed interpersonal factors in this study. Intrapersonal factors in this study refer to personal conviction, academic ability, self-efficacy, champion mind-set, professional interest, personality, personal growth, spirituality, and morality. Career outcome expectancy is interpreted as professional opportunities and prospects, financial security, independence, ability to support family's financial demands and economic expectations. This study therefore investigated the factors influencing career choice among STEM undergraduates in Nigeria universities.

Conceptual and Theoretical Framework

Adopted model of factors responsible for undergraduates' choice of STEM career is presented in **Figure 1**.

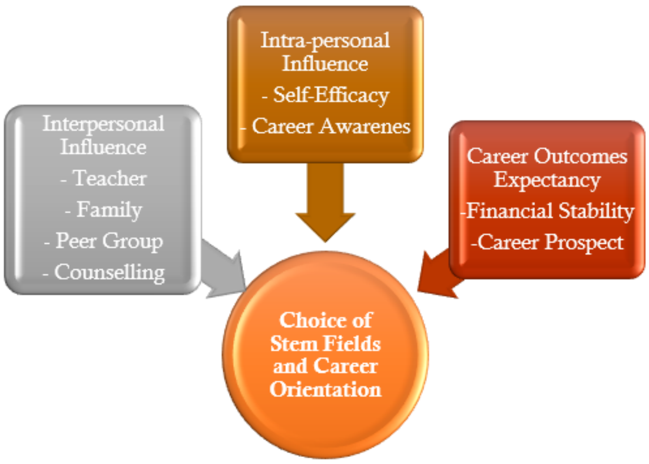

Figure 1. Conceptual framework (Source: Authors' own elaboration)

The social cognitive career theory (SCCT) of Lent et al. (2008) is adopted for this study to explains the way academic and career interests are developed through educational and career choices. With SCCT, learner's behavior is regarded as co-modifier of the society based on triadic reciprocal causality model. This theory posits that the intention to choose a career is based on three cognitive constructs of- choice goal, outcome expectation and self-efficacy. This position is substantiated by the role of environmental factors in learners' choice of career (Lichtenberger & Casey, 2013). Lent et al. (2017) corroborated the positions of Bett (2013) and Lichtenberger and Casey (2013) that self-efficacy, career choice and expectation do not exist in isolation, rather, are impacted by individual experience/perception, parental and peer influence, encouragement from teacher as well as their role in learning. Cognitive factors is said to modify interest and choice of a profession, which reflects on performance before personal trait and environment.

LITERATURE REVIEW

The study of Mitsopoulou and Pavlatou (2021) researched factors responsible for secondary school students' interest in studying STEM fields in higher institution. A descriptive survey, which sampled 301 students among Greek senior secondary schools. An adapted questionnaire from Greek educational system formed the instrument employed for data gathering. From the findings of the study, exposure to STEM activities, experience of learners in and outside the school, and performance in difficult STEM subjects were gainful correlates of interest development to study STEM fields. Furthermore, 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 associative of decision to continue studying STEM after secondary school but not in a particular field. The study concluded that career outcome expectancy and self-efficacy contributes more to students' development of interest to study STEM related courses in higher institution with no gender influence on this decision.

In a similar study, Abe and Chikoko (2020) investigated career decision-making factors among undergraduates studying STEM related courses in universities in South African. A qualitatively study, which employed hermeneutic phenomenology and content analysis explored peers, family, teachers and career interest as factors contributing to decision making in STEM. From modified verification, interrogation of peers, recode tactics, and assessment trails, three results emerged, which are interpersonal, intrapersonal and career outcome expectancy. Perception of students on career decision was reported to be multifaceted with varied experiences. Personal-mentality, family expectation among others were considered to be paramount in career decision making in the study.

Opeke et al. (2020) examined knowledge sharing in STEM career path among junior secondary school girls in North-Central, Nigeria. A descriptive survey, which indulged multistage sampling technique in the selection of 361 students from Federal Government colleges in the zone. Researcher designed questionnaire validated through expert opinion formed the instrument employed for data gathering. Binary logistics regression was used to analyze the data gathered. Findings from the study showed that, knowledge sharing was a correlate of STEM career path and choice of intension. Students at junior secondary have high intension to go through with a career choice in STEM, which is an indicator of knowledge sharing. It was recommended that authorities and policy makers should incentivize studying STEM fields among girls of all ages to fill the gender and expertise gap. Also, educational games, science club and group discussion were recommended to boost knowledge sharing opportunities among girls

Engagement among middle school students in STEM was investigated by Almeda and Baker (2020). In the study, the construct for measuring decision to participate in STEM career after attending college among middle school student formed the focus of the study. comparison between groups of students who took a STEM job and those who did not was done with statistical tool of independent t-test to measure the difference in the mean group of engagement, knowledge and number of tutors. The sample of participants who previously had engaged in the ASSISTments tutoring program and agreed to participate after high school academic and career development were the respondents. The study recommended that occasional disengagement from rigorous academic engagement (unsupervised activities, gaming, and carelessness) hold the possibility of predicting and can avail actionable data for stakeholders to integrate early interventions to encouraging learners in taking up careers in STEM.

Rivera and Li (2020) study randomly sampled one thousand, one hundred and five respondents to investigate significant predictors of STEM college learning and career orientation through multiple regression analysis across high schools in Houston Texas. In the study, 42% variance was revealed as STEM college learning and career orientation among six outcome predicting variables, which include STEM related activities engagement, technology/facilities, parental influence, academic experience, self-esteem and effective teacher pedagogy. The study concluded that parent and teachers as support system for students is crucial to their development of the right attitude and interest towards STEM career.

Blotnicky et al. (2018) researched among career interest, mathematics self-efficacy and career activities as correlate of STEM career choice among middle school pupils. The study sampled from grade 7 to 9 a total of 1,448 respondent from government owned schools in Atlantic Canada. An investigation of the knowledge of mathematics and science required by students to excel in STEM related career. An overall lack of knowledge of science and mathematics was reported with higher predominance among younger students. The study also found that higher mathematics self-efficacy to predict awareness about requirement in STEM career and are more likely to choose STEM fields. Furthermore, interest in scientific and technical know-how were likely to choose STEM fields as against those that preferred practically engaging concrete activities.

Research Questions

We provide answers to following research questions:

1. **RQ-1:** To what extent does interpersonal factors influence undergraduate students' choice of STEM fields?
2. **RQ-2:** To what extent do intrapersonal factors influence undergraduate students' choice of STEM fields?
3. **RQ-3:** To what extent do career outcomes expectancy influence undergraduate students' choice of STEM fields?
4. **RQ-4:** Which of the factors influence undergraduates' choice of STEM fields most?

Research Hypotheses

The following hypotheses were raised based on the research questions:

1. **$H0_1$:** Interpersonal factors will not significantly influence undergraduates' choice of STEM fields.
2. **$H0_2$:** Intrapersonal factors will not significantly influence undergraduates' choice of STEM fields.
3. **$H0_3$:** Career outcomes expectancy will not significantly influence undergraduates' choice of STEM fields.

METHODOLOGY

This research is quantitative research, which adopts descriptive research of the survey type for data gathering with the assumption that the selected participant are representatives of the entire population set. The population for this study comprised of undergraduate students at public university in South-west, Nigeria (**Table 1**). The population consisted of undergraduates across all fields from these universities. Only undergraduates studying STEM courses were targeted for participation, which indicated that the sampling was purposive. Participation was voluntary and the decision to withdraw were made know to the participants. However, of 623 possible participants (reached via email), only 204 undergraduates filled and submitted the electronic questionnaire with four arbitrary responses. A researcher designed questionnaire titled undergraduate career choice questionnaire (UCCQ) was electronically designed using Google Form to collect data. UCCQ comprises of five sections. Section A contains the demographic data of the respondents. Section B, C, and D contains four Likert scaled (strongly agree, agree, disagree, strongly disagree) 10 items each on interpersonal, interpersonal and career outcome items on the pre-set objectives.

Table 1. Distribution of respondents by gender, level, & STEM faculty

Variables	Frequency	%
Gender		
Male	101	50.5
Female	99	49.5
Total	**200**	**100.0**
Level		
100 level	32	16.0
200 level	43	21.5
300 level	49	24.5
400 level	61	30.5
500 level	15	7.5
Total	**200**	**100.0**
Faculty		
Engineering & technology	22	11.0
Education	67	33.5
Life science	24	12.0
Veterinary science	6	3.0
Agriculture	30	15.0
Physical science	22	11.0
Pharmaceutical science	4	2.0
Environmental science	11	5.5
Basic medical sciences	7	3.5
Clinical sciences	7	3.5
Total	**200**	**100.0**

Items on interpersonal factors included reason for the choice of STEM, the role of teacher, quality of instruction, parental, sibling, and peer influence as well as family support were among the constituents of the ten questions in this section. Secondly, intrapersonal questions ranged from confidence in choice of STEM, self-efficacy, competence based on performance, access to internet and support materials, personal views about STEM and non-STEM fields, financial support, and perceived family needs. Finally, the last section of the instrument accounted for items on career outcome, which included perceived job opportunities, perceived working conditions, perceived financial benefits, job stability, fulfilment, prestige, and societal preference.

To validate UCCQ items in terms of clarity, usability, appropriateness of language, ambiguity and relativity of questions asked to research questions and hypotheses. Comments and suggestions of experts were incorporated to improve the quality of the instrument. Also, the questionnaire was administered to twenty respondents who were not part of the general participants.

The internal consistency of the responses was determined by split-half method at .05 level of significance. The Cronbach's alpha value obtained was 0.86, which implies the instrument was reliable. Consent of the participants were sought before their answering of UCCQ. The completed copies of the questionnaire were retrieved as CSV file, which was later extracted into SPSS.

RESULTS

RQ-1: To What Extent Does Interpersonal Factors Influence Undergraduate Students' Choice of STEM Fields?

Participants' responses on interpersonal factors influence on undergraduates' choice of STEM fields was collated. The data collected from the sampled students were summed. The minimum score, maximum score and range score of the respondents were 10, 40, and 30, while the cut off score was 10. Scores between 10-25 were categorized as low, and 26-40 were high on extent of interpersonal factors, which influence undergraduates' choice of STEM fields. The summary of the results is as shown in **Table 2**.

Table 2. Extent of interpersonal factors influence undergraduates' choice of STEM fields

Interpersonal influence choice of STEM	Frequency	%
Extent		
High extent	138	69.0
Low extent	62	31.0
Total	**200**	**100.0**

The result on **Table 2** indicated that 138 (69.0%) agreed that interpersonal factors influence undergraduates' choice of STEM fields to a high extent, while 62 (31.0%) agreed posited that interpersonal factors influence on undergraduates' choice of STEM fields in low. This implied that the interpersonal factors influenced undergraduates' choice of STEM fields.

H_{O1}: Interpersonal Factors Will Not Significantly Influence Undergraduates' Choice of STEM Fields

In order to test this research hypothesis one, participants' responses to the interpersonal factors influence on choice of STEM fields were collated. The data collated was analyzed as shown in **Table 3**.

Table 3. One-way ANOVA summary: Interpersonal factors influence on undergraduate students' choice of STEM fields

Source of variance	SS	df	MS	F	Sig.
Between groups	134.40	9	14.93	1.48	.16
Within groups	1,918.38	190	10.11		
Total	**2,052.78**	**199**			

Note. SS: Sum of squares; MS: Mean square; & p<0.05

Table 3 indicates an F-value of 1.48 with calculated significance value of .16 at 0.05 alpha level. Since calculated significance .16 is greater than 0.05 alpha level, hypothesis one is thus not rejected. This implies that there is no significant influence of interpersonal factors on undergraduates' choice of STEM fields. This implies that interpersonal factors did not influence the students' choice of STEM fields.

RQ-2: To What Extent Do Intrapersonal Factors Influence Undergraduate Students' Choice of STEM Fields?

To answer research question two, participants' responses on intrapersonal factors influence on undergraduates' choice of STEM fields was collated. The minimum score, maximum score, and range score of respondents were 10, 40, and 30, while cut off score was 10. Scores 10-25 and 26-40 were categorized as low and high extent on interpersonal factors, respectively.

The summary of the result is shown on **Table 4**.

Table 4. Extent of intrapersonal factors influence undergraduates' choice of STEM fields

Intrapersonal influence choice of STEM	Frequency	%
Extent		
High extent	193	96.5
Low extent	7	3.5
Total	**200**	**100.0**

The result in **Table 4** indicates that 193 (96.5%) agreed that intrapersonal factors influenced undergraduates' choice of STEM fields to a high extent, while seven (3.5%) agreed that intrapersonal factors influence undergraduates' choice of STEM fields to a low extent.

H_{O2}: Intrapersonal Factors Will Not Significantly Influence Undergraduates' Choice of STEM Fields

Responses from participants on intrapersonal factors influence on STEM fields were collated and analyzed as shown on **Table 5**.

Table 5. One-way ANOVA summary: Intrapersonal factors influence on undergraduate students' choice of STEM fields

Source of variance	SS	df	MS	F	Sig.
Between groups	174.21	9	19.36	3.20	.00
Within groups	1,148.82	190	6.05		
Total	**1,323.02**	**199**			

Note. SS: Sum of squares; MS: Mean square; & p<0.05

Table 5 indicates an F-value of 3.20 with calculated significance value of .00 at 0.05 alpha level. Since calculated significance .00 is lower than 0.05 alpha level, hypothesis two is thus rejected. This implies that there is a significant influence of intrapersonal factors on undergraduates' choice of STEM fields. **Table 6** shows Scheffe's post-hoc interpretation of result from **Table 5**.

Table 6 shows Scheffe's post-hoc for influence of intrapersonal factors on undergraduates' choice of STEM fields. From 10 STEM fields, pharmaceutical science students had the highest mean score of 33.75, followed by engineering and technology students with a mean score of 32.45, basic medical sciences students with a mean score of 32.29 is next, veterinary science students with a mean score of 32.27, life science students with a mean score of 31.21 was next, agriculture students had a mean score of 31.07, physical science students had a mean score of 31.05, environmental science students had a mean score of 30.18, education students had a mean score of 30.03, while clinical sciences student has the least mean score of 30.00. This implies that the influence of intrapersonal factors is most common among pharmaceutical science undergraduates.

RQ-3: To What Extent Do Career Outcome Expectancy Influence Undergraduate Students' Choice of STEM Fields?

In order to answer this research question, participants' responses on career outcomes expectancy from UCCQ. was analyzed. The minimum score, maximum score and range score of the respondents were 10, 40, and 30, while the cut off score was 10. Scores between 10-25 and 26-40 were categorized as low, and high extent respectively. The summary of the results is shown in **Table 7**.

Table 7. Career outcome expectancy influence on undergraduates' choice of STEM fields

Outcome influence choice of STEM	Frequency	%
Extent		
High extent	195	97.5
Low extent	5	2.5
Total	**200**	**100.0**

Result on **Table 7** shows the responses of participants to items that sought information on career outcomes expectancy influence on undergraduates' choice of STEM fields. The result on **Table 7** indicated that 195 (97.5%) agreed that career outcomes expectancy factors influence undergraduate students' choice of STEM fields, while five (2.5%) agreed that career outcomes expectancy influence on undergraduates' choice of STEM fields in low.

Table 6. Scheffe's post-hoc table for intrapersonal factors influence on undergraduates' choice of STEM fields

STEM fields	n	1	2	3	4	5	6	7	8	9	10
Clinical sciences	7	30.00									
Education	67		30.03								
Environmental science	11			30.18							
Physical science	22				31.05						
Agriculture	30					31.07					
Life science	24						31.21				
Veterinary science	6							32.27			
Basic medical sciences	7								32.29		
Engineering & technology	22									32.45	
Pharmaceutical science	4										33.75

Note. Subset for alpha=0.05

H_{03}: Career Outcome Expectancy Will Not Significantly Influence Undergraduates' Choice of STEM Fields

In order to test for hypothesis three, participants' responses to career outcome expectancy from UCCQ was collated and analyzed as shown on **Table 8**.

Table 8. One-way ANOVA summary: Career outcomes expectancy on undergraduates' choice of STEM fields

Source of variance	SS	df	MS	F	Sig.
Between groups	128.34	9	14.26	1.33	.22
Within groups	2,032.21	190	10.77		
Total	**2,160.56**	**199**			

Note. SS: Sum of squares; MS: Mean square; & p>0.05

From **Table 8**, F-value of 1.33 with calculated significance value of .22 at 0.05 alpha level. Since the significance value of .22 is greater than 0.05 alpha level, hypothesis three is thus not rejected. This implies that there is no significant influence of career outcomes expectancy on undergraduate students' choice of STEM fields in this study.

RQ-4: Which of the Factors Influence Undergraduates' Choice of STEM Fields Most?

The data collected from research questions 1-3 is summarized in **Table 9**.

Table 9. Mean rating of major factors influence undergraduate students' choice of STEM fields

S/N	Factors influence students' choice of STEM fields	Mean	Ranking
3	Career outcome	33.67	1st
2	Intrapersonal	30.93	2nd
1	Interpersonal	27.19	3rd

From **Table 9**, the most likely factors to influence undergraduates' choice of STEM fields was career outcome, which has a mean score of 33.67 comes 1st, while intrapersonal with a mean score of 30.93 comes 2nd, and interpersonal, which has a mean score of 27.19 was 3rd.

DISCUSSION

Interpersonal factors influence undergraduates' choice of STEM fields to a large extent, which may be explained by the fact that students frequently discuss with their peers, as such, can influence one another's choice of career or academic discipline. This result concurs with that of Halim et al. (2018) who found that social media and familiarities are the primary elements that have a significant impact on students' decisions to pursue STEM careers. Intrapersonal factors also influence undergraduates' choice of STEM fields and in agreement with the study of Kauffmann et al. (2009) who found that intrapersonal factors have the biggest impact on high school students' choice of careers in STEM disciplines. Furthermore, career outcomes expectancy influence undergraduates' choice of STEM fields as corroborated by Miller and Hurlock (2017) whose finding revealed that career outcome expectancy highly influence STEM-promising females' decision to attend a non-research-intensive undergraduate institution.

Furthermore, the singular factor that influence undergraduates' choice of STEM fields most was career outcomes expectancy. Participating students hope to take advantage of the professional opportunities and prospects they perceive in the STEM sectors to achieve financial security and independence, which is in tandem with the studies of Badmus and Omosewo (2020), Byars-Winston et al. (2010), and Tan et al. (2021). The potential to support families' financial demands could be the principal reason for joining STEM fields as indicated in the section of the questionnaire to attain financial stability and meet economic expectations. This provides educators and stakeholders interested in closing the STEM skills gap the motivation behind students' decision to major in STEM for prospect, as such, adequate attention should be paid to the degrees to which the expectation of career outcomes affects students' career, decision-making, creation of positive initiatives, and provision of structures that foster strategics economic balance for STEM hopefuls (Wahba et al., 2022).

Additionally, finding indicates that there is no significant influence of interpersonal factors on undergraduate students' choice of STEM fields. This finding is consistent with that of Abe and Chikoko (2020), Heddy and Sinatra (2017) who stated that interpersonal connections kids make with their peers, teachers, and families are important when deciding on a profession in the STEM disciplines. The model developed by Bennett and Phillips (2010) supported the idea that while choosing a job, students consider a variety of beliefs and experiences that have a distinct impact on different people. The participants' career decisions were shown to have been influenced to varied degrees by their family and teachers. Previous research demonstrating family influence as a dominant theme among the themes in professional decision making is also consistent with this conclusion (Nugent et al., 2015; Workman, 2015).

Also, finding shows that there was a significant influence of intrapersonal factors on undergraduate students' choice of STEM fields. Even though it is notable that cognitive factors have a significant impact on career decision-making, participants also mentioned champion mentality, prestige associated with STEM programs, being the first person in the family to study any STEM program, spirituality, and morality as reasons for their career choice. This result is consistent with that of Crisp et al. (2009), who found that STEM students used intrapersonal reasons such as champion mind-set, professional interest, personality, personal growth, self-efficacy, spirituality, and morality to justify their choice to seek a degree in STEM. Additionally, research by Tzu-

Ling (2019), Wu et al. (2020), and Yu and Jen (2021) found that interest, self-efficacy, and personality have an impact on career decision-making. This suggests that the emphasis on individual cognitive factors in studies on career decision-making is justifiable.

Finally, no significant influence of career outcomes expectancy on undergraduates' choice of STEM fields is reported. However, research findings also make it clearer how participants evaluated possibilities and prospects in STEM fields. This outcome anticipation description is particularly helpful as it could help career counsellors advise students on career goal in STEM. This result supports the findings of Iroaganachi et al. (2021) and Kazi and Akhlaq (2017), who posited that, in addition to family, teachers, self-efficacy, interest, spirituality, morality, and personality, other factors have a role in students' decisions to pursue careers in STEM. Furthermore, Nugent et al. (2015) noted that outcome expectancy, a construct gauging students' perceptions of particular jobs based on their projected financial, societal, and self-satisfaction consequences, was found to be important in STEM students' career decision-making. According to research by Baglama and Uzunboylu (2017), Mau et al. (2021), and Peña-Calvo et al. (2016), STEM students' career success expectations are significantly predicted by their self-efficacy in making career decisions.

CONCLUSION

The findings of this study substantiate the notion that professional self-efficacy, school impact, and family support, which are subcomponents of the factors considered in this study play important roles in the decision-making process for STEM careers. Evident from this study, STEM undergraduates consider many viewpoints and experiences, which are embedded in interpersonal, intrapersonal and career outcome while making career decisions. They also evaluate the impact of interpersonal, intrapersonal and career outcomes variables at various levels and for various reasons. Curiously, career outcome expectancy component emerged as the most influential among a plethora of other factors. STEM instructors may help students make decisions that reflect their values and experiences by understanding their perspectives on professional decision-making.

Recommendations

While the essence of this study is to proffer ideas to stakeholders on how to remediate to skill deficit in STEM, this study recommends that learners should be encouraged to pursue STEM careers through family influence as many undergraduates said that their expectations for their career choices were a factor, while other cited family. These factors may be considered and included into upcoming STEM outreach and programs. The determinant factors to how students choose their careers have the possibility of impacting how institutional policies, educational leaders, and stakeholders determine the kind of support expected to buffer career choice among learners.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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