frontiers | Frontiers in Education

TYPE Original Research
PUBLISHED 09 October 2024
DOI 10.3389/feduc.2024.1484761

OPEN ACCESS

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RECEIVED 22 August 2024
ACCEPTED 27 September 2024
PUBLISHED 09 October 2024

CITATION
Abdi AI, Mahdi AO, Omar AM, Asiimwe C and Osman MA (2024) Influence of career awareness on STEM career interests among foundation-year students in Mogadishu, Somalia.
Front. Educ. 9:1484761.
doi: 10.3389/feduc.2024.1484761

Influence of career awareness on STEM career interests among foundation-year students in Mogadishu, Somalia

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This study investigates the influence of career awareness on STEM career interests among Foundation-year students in Mogadishu, Somalia. By examining self-efficacy, outcome expectations, and academic performance as mediating factors, the research provides new insights into the complex relationships that shape students' aspirations in STEM fields. Data were collected through a survey of 321 students across four private and public universities and analyzed using Structural Equation Modeling in R-Programming to ensure rigorous evaluation of validity and reliability. The findings reveal that self-efficacy plays a pivotal role in motivating students to pursue STEM careers. At the same time, positive outcome expectations and academic achievements further reinforce their interest in STEM pathways. Although the direct relationship between STEM career awareness and career interests was not statistically significant, the results emphasize the importance of fostering self-belief among students. This study contributes to the understanding of the multifaceted factors influencing STEM career interests and offers practical strategies to enhance self-efficacy, positive outcome expectations, and academic excellence. These findings can inform the development of interventions aimed at inspiring and empowering students in their pursuit of STEM careers.

KEYWORDS

career awareness, STEM career interests, self-efficacy, outcome expectations, academic performances

1 Introduction

The STEM fields—science, technology, engineering, and mathematics—are the foundations of innovation and advancement in the rapidly changing sectors of education and job development (Roller et al., 2018; Tscholl et al., 2023; Yu et al., 2019). A career in STEM not only determines one's future but also drives economic growth and societal progress (Hasanah, 2020). However, there are many factors that influence the paths students take in pursuing STEM careers and having knowledge about these careers is a crucial factor in guiding children in that direction (Blotnicky et al., 2018; Roller et al., 2018).

To effectively cultivate a strong STEM workforce, it is important to understand the complex interactions between career knowledge, self-efficacy, outcome expectations, and academic achievement in higher education (Chao et al., 2017; Han et al., 2021). Investigating

the factors that influence students' interest in STEM jobs is particularly important in Mogadishu, Somalia, where there are unique and diverse educational environments (Carpi et al., 2017). By exploring the nuances of these influences, we can develop interventions and instructional practices specifically designed to foster students' enthusiasm for STEM subjects and prepare them for rewarding careers in these fields (Sheng et al., 2023).

Studying how self-belief, outcome expectancies, and career awareness interact to shape students' goals in STEM areas has significant implications for practitioners, policymakers, and educational institutions (Yurchenko and Semenikhina, 2023). This study aims to uncover the mechanisms that drive students' career decisions and aspirations in STEM fields by analyzing the complexities of these aspects within the context of higher education in Mogadishu (Abdi et al., 2024). Our ultimate objective is to create a thriving ecosystem for STEM education and workforce development in Mogadishu and beyond. We aim to provide valuable insights that can inform educational practices, policymaking, and career guidance programs (Roller et al., 2018).

1.1 Problem statement

Despite the growing emphasis on STEM education worldwide, there is still limited knowledge regarding the impact of career knowledge on students' likelihood of pursuing STEM careers (Tytler et al., 2023). Specifically, there is limited understanding of the intricate connections between academic achievement, result expectancies, and self-efficacy in higher education settings in Mogadishu, Somalia. This research aims to uncover these complex mechanisms and shed light on the factors that shape students' choices regarding STEM career paths.

1.2 Aim of the study

This study aims to examine the correlation between career knowledge and students' inclination toward STEM occupations, particularly focusing on the influence of academic performance, outcome expectations, and self-efficacy within Mogadishu's higher education system. Through a thorough analysis of these factors, we aim to gain a comprehensive understanding of the elements that impact students' decisions regarding STEM careers. This research will contribute to the advancement of STEM education and career development.

This study makes a significant contribution by focusing on Foundation-year students in Mogadishu, Somalia, a group that has been largely overlooked in STEM education research—. This research lies in its exploration of how career awareness, self-efficacy, and outcome expectations interact specifically within the Somali educational context, providing insights that can be applied to similar environments. Additionally, this study offers a comprehensive model based on Social Cognitive Career Theory (SCCT) to understand the factors influencing STEM career interests, which can serve as a foundation for future research and policy development.

This paper is structured as follows: After this introduction, we present the problem statement and the aim of the study, followed by a detailed discussion of the proposed research model based on SCCT. The subsequent sections include a review of relevant literature, the methodology used in the study, the results of the data analysis, and a discussion of the findings. Finally, the paper concludes with implications for practice and suggestions for future research.

1.3 Proposed research model

This study, which is based on the Social Cognitive Career Theory (SCCT) paradigm, suggests that individuals' career decisions are influenced by their self-beliefs, expectations of outcomes, and contextual factors (Mohtar et al., 2019). Based on our hypothesis, students' interest in STEM jobs is directly affected by their awareness of careers, with self-efficacy and outcome expectations acting as mediating factors (Ortiz-Guerrero and Loizzo, 2024). Additionally, we propose that students' self-efficacy and outcome expectations regarding STEM courses are positively influenced by their knowledge of STEM careers, which moderates the relationship between career awareness and career preferences (Jiang et al., 2024). Our objective is to provide educators, policymakers, and career advisors with valuable insights by analyzing the complex interactions among various elements that shape children's aspirations in STEM professions using this comprehensive model (Ejiwale, 2012).

This study investigates the correlational relationships between career awareness, self-efficacy, outcome expectations, academic performance, and STEM career interests among Foundation-year students in Mogadishu, Somalia. The primary aim is to understand how these predictors influence students' interests in pursuing STEM careers. By examining these relationships, the study seeks to provide insights into the factors that contribute to or hinder the development of STEM career interests.

2 Literature

2.1 Students' interests in STEM careers

The definition of STEM career interests is people's overall desire to pursue STEM-related professions in the future, such as those of scientists, engineers, or technologists (Holincheck and Galanti, 2023). According to earlier research, students' interest in STEM careers significantly predicts their STEM selections (Holincheck and Galanti, 2023). Different STEM job sectors, however, may have different student interests. For example, the China STEM Education Research Report (Holincheck and Galanti, 2023) revealed that Chinese students are relatively less interested in jobs linked to veterinary medicine, while they are noticeably more interested in fields related to computers. Furthermore, it is imperative to recognize that there may be differences in the factors influencing kids' interest in different STEM vocations.

For instance, Jiang et al. (2024) found a link between students' preferences for math and scientific courses and their interests in engineering but not in fields connected to healthcare.

Few studies have examined the variables underlying the variety in students' interests in STEM occupations, despite recent focus from certain scholars (Ortiz-Guerrero and Loizzo, 2024) on the diversity of STEM careers. Some research has tried to classify STEM occupations in an effort to close this disparity. For example, Cheng et al. (2016)

used cluster analysis to divide STEM jobs into subcategories that were more analytical or empathic, depending on whether one valued strong analytical abilities or more empathy. STEM careers are divided into two main categories: biol/Med and core STEM, whereas Ortiz-Guerrero and Loizzo (2024) made a distinction between life science and physical science. However, we discovered that there are differences in emphasis even within life science STEM occupations. For example, environmental science focuses more on life-survival issues, whereas medicine essentially addresses life-healthy issues. As a result, many classification systems for STEM occupations might exist. This study aimed to provide empirical insights into the influencing elements of various STEM career categories, given the narrow scope of prior research in this field. In order to do this, we first used data analysis to classify STEM jobs into smaller groups, and then we looked into the effects of several potential factors on each group.

2.2 Career awareness and STEM career interests

Career awareness is considered a fundamental concept in career development (Tscholl et al., 2023). Ansari and Khan (2020) have highlighted the critical role that career awareness plays in the early phases of career development, which is consistent with Super's model of lifelong career development. Ejiwale (2012) defines career awareness as a person's comprehension of the expectations and laws of a particular industry, the work environment, education and skill needs, and current job prospects. It is imperative to acknowledge the existence of a closely comparable notion, namely career perception, as both are concerned with the opportunities and competencies connected with a particular vocation (Tscholl et al., 2023).

Nonetheless, in order to preserve conceptual clarity, it is essential to discern their slight differences. After doing a thorough assessment of the literature, we concluded that career awareness mainly refers to a person's understanding and familiarity with information relevant to careers (Liu et al., 2023). It emphasizes "what do you know, and how well-informed are you?" and can range from "uninformed" to "informed." In contrast, one's perceptions of a career are the focal point of career perception (Ortiz-Guerrero and Loizzo, 2024). These opinions can be "positive" or "negative, "with an emphasis on "what do you believe, and how do you think?"

According to Jiang et al. (2024), students' impression of a STEM career can be significantly impacted by their basic understanding of career needs, such as required skills and job prospects. From this angle, we propose that career awareness may influence career perception, which would then be an effect of it. Both ideas are closely related to choosing a career, according to earlier studies (Mohtar et al., 2019; Verma and Ali, 2023). Given its adaptability, a multitude of interventions pertaining to careers seek to enhance students' attitudes or awareness of careers. The aim of this study was career awareness in STEM fields, which is defined as an individual's understanding and knowledge about job profiles, employment opportunities, and skill requirements in.

We also included pertinent data on career perspective where needed, given the minor differences and intimate connection between this idea and career perception. According to earlier research (Jiang et al., 2022; Verma and Ali, 2023), the quality and emphasis of a school's STEM career guidance may have a significant impact on students' awareness of STEM careers. These disparities could influence how different pupils decide whether to pursue STEM jobs. According to Mohtar et al. (2019), students may develop educational and vocational expectations that are at odds with their academic accomplishments due to a lack of accurate information about employment prospects and the qualifications needed for different positions. This could hinder their success in the job market in the future.

Students sometimes lack a thorough knowledge of STEM occupations despite the field's generally bright employment prospects and benefits (Jiang et al., 2022; Verma and Ali, 2023). This lack of knowledge may discourage many students from thinking of STEM fields as feasible career paths. While the literature already in existence emphasizes the importance of STEM career awareness, little is known about the precise mechanisms by which it influences students' interests in STEM careers, and there is a shortage of research on the effects of STEM career awareness on different kinds of STEM career interests. Few researchers have examined the impact of STEM career awareness and the associated idea of career perception on students' career paths (Abdi et al., 2024).

These investigations have not, however, come to a consensus. Mohtar et al. (2019) found, for example, that students were more likely to select a STEM job if they knew more about STEM careers. According to Jiang et al. (2024), the association between interest and job ambitions may be moderated by knowledge of science-related careers. According to Adeboye et al. (2023), there are differences in the effects of STEM career perspective on the various forms of STEM career interest. It can have a direct impact on students' interest in STEM jobs centered on the biological sciences but not the physical sciences. Remarkably, there is still a dearth of pertinent research in China despite studies on the connection between STEM career knowledge and career interests existing in Western cultural contexts.

Further research on the correlation between STEM career awareness and career interests among Chinese adolescents is necessary, given the notable distinctions between China's educational system and cultural background compared to the West. In order to fill in the gaps in the literature, one of the main goals of this study is to investigate the mechanisms and degree to which STEM career awareness influences Chinese students' career interests. The following hypothesis is put out considering the body of extant literature:

> *H*1: Foundation year students' interests in STEM careers would be directly influenced by their awareness of STEM careers.

2.3 Mediating roles of self-efficacy and outcome expectations between career awareness and interests

Scholars have employed diverse methodologies to investigate the reasons behind students' selection of STEM fields in order to acquire a comprehensive comprehension of these decisions (Kennedy, 2014). The Social Cognitive Career Theory (SCCT) is a frequently employed theoretical framework that explains teenagers' choices in school and careers (Nasir and Lin, 2012). Based on Bandura's Social Cognitive Theory (Nabi et al., 2014), SCCT offers a theoretical framework for comprehending people's career decisions and performance in specific

domains. Learning experiences, self-efficacy, and outcome expectations in SCCT explain career interest development. Self-efficacy concerns a person's belief in their capacity to excel in a particular field (such as STEM), whereas outcome expectations are a person's expectations about the results. Both are seen to be important motivators for career interests, and expectations for results may be further influenced by self-efficacy. Learning experiences are seen as important sources of self-efficacy and outcome expectations. These experiences include past personal experiences, verbal preconceptions from others, and vicarious learning (Lent et al., 1994). According to the framework, learning experiences have an impact on self-efficacy and outcome expectations, which in turn might influence career interests. Nevertheless, SCCT does not explicitly address how learning experiences and job-related outcomes, such as career awareness, can affect teenagers' career decisions by either enhancing or impairing their self-efficacy and outcome expectancies.

Conversely, some career development research has focused on how people develop career awareness during their developmental trajectory through a variety of learning experiences, which in turn shapes how they make career decisions (Nasir and Lin, 2012). For instance, Nasir and Lin (2012) found that career advice programs could improve kids' awareness of potential careers in elementary school, which could impact their desire to pursue careers. A small body of research has highlighted the influence of career knowledge on individual self-efficacy and outcome expectations. These factors then influence career choices and decision-making processes (Verma and Ali, 2023).

For example, Hashish (2019) discovered that increasing nursing students' career awareness had a favorable impact on their career self-efficacy, allowing them to overcome prospective career obstacles effectively. Nevertheless, the complex links between career awareness, self-efficacy, outcome expectancies, and career preferences in the STEM fields have not been sufficiently investigated in prior research. Therefore, in order to explore the particular expressions of these elements within this domain, this study aims to apply the SCCT in conjunction with the body of existing information about career awareness in the STEM fields. Our goal is to find out if learning experiences that lead to a greater understanding of STEM occupations might affect people's expectations for themselves and their self-efficacy in STEM courses, which in turn affects their interest in STEM careers.

2.4 Self-efficacy, outcome expectations, and STEM career interests

Previous research has demonstrated, in line with the SCCT paradigm, that students' interest in STEM occupations can be favorably predicted by self-efficacy and result expectations related to STEM activities (Hashish, 2019; Liu et al., 2023). The positive predictive influence of self-efficacy on career preferences in STEM was confirmed by Nabi et al. (2014), who went on to clarify that teens' expectations for their outcomes can impact their interest in STEM fields, which is influenced by their self-efficacy in STEM. It is interesting, nonetheless, that different viewpoints on outcome expectations and self-efficacy in STEM courses are presented in the extant research. While some studies (Hashish, 2019) treat STEM as a whole, they treat STEM as discrete subjects, such as science and mathematics.

Previous research (2020) has demonstrated that students' interest in STEM occupations can be positively predicted by self-efficacy and result expectations related to STEM activities, which is in line with the SCCT framework. The beneficial predictive influence of self-efficacy on STEM career preferences was confirmed by Struyf et al. (2019). Their expected results further clarified how adolescents' self-efficacy in STEM can influence their interest in STEM jobs. The fact that different viewpoints on STEM course self-efficacy and outcome expectations are presented in the literature, nevertheless, is notable. While some studies consider STEM as discrete topics, such as science and mathematics, others take a comprehensive approach to the field (Jiang et al., 2024), which not only perfectly captures the outcomes and self-efficacy expected of STEM courses but also suggests how they relate to one another. According to theory, students' job interests should be influenced by their STEM self-efficacy and outcome expectations. However, this theoretical premise has not been thoroughly proven true in the context of Chinese culture. Therefore, examining this association in order to close the current research gap on the topic is one of the main goals of this work. Consequently, we put up the following hypothesis:

> *H*2a: Career interests in STEM fields would be strongly influenced by self-efficacy and outcome expectations for STEM courses, with self-efficacy also having an impact on outcome expectations.

2.5 STEM career awareness and self-efficacy, outcome expectations

Previous studies have shown that specific learning experiences or educational processes, such as classroom instruction, career guidance from the school, involvement in extracurricular activities, or internet resources, are frequently the source of students' awareness of STEM careers (Adeboye et al., 2023). Students' understanding of STEM occupations increases as a result of these experiences. Their self-efficacy and outcome expectancies are positively impacted by this increased professional awareness (Adeboye et al., 2023; Hashish, 2019; Nasir and Lin, 2012).

Geng et al. (2019), for instance, supported our viewpoint by confirming that students' favorable perceptions of engineering can help their self-efficacy and career expectations in the field. Although the SCCT and available data offer a theoretical framework for the impact of professional awareness on self-efficacy and outcome expectations, there has not been much research done on how to apply this relationship in the STEM fields. Supporting this idea with accurate data is one of our research goals. In order to do this, we put up the following theory:

> *H*2b: STEM career awareness is expected to positively impact students' self-efficacy and outcome expectations for STEM courses.

2.6 Mediating roles of self-efficacy and outcome expectations

According to Lent et al. (1994), the SCCT makes the explicit claim that learning experiences mold a person's self-efficacy and

outcome expectations, which in turn affect their career preferences. Based on existing research (Chao et al., 2017; Han et al., 2021), this study proposes that learning experiences associated with STEM career pathways should prioritize the development of STEM career awareness. We suggest that STEM career awareness, which is gained through learning experiences, may influence career interests through the mediating effects of self-efficacy and outcome expectations associated with STEM courses. This is based on the evidence that is currently available and the SCCT framework.

The only study that presents a comparable viewpoint is Bueno et al. (2022), which shows how STEM preconceptions held by primary school kids can influence career interests by predicting self-efficacy and result expectations. The study adopts a different approach from Ejiwale (2012), who concentrated on the stereotypes of STEM careers (such as the idea that those in STEM-related fields typically work physically). We place a strong emphasis on students' thorough comprehension of STEM fields and occupations, looking beyond stereotypes to examine a more expansive viewpoint. There is currently a lack of empirical data to support the theoretical framework that previously established a connection between STEM career knowledge and STEM self-efficacy, result expectations, and career preferences.

The main objective of this study is to empirically investigate the potential mediating role of STEM course self-efficacy and outcome expectations. Therefore, we propose the following hypothesis:

> *H3*: STEM course self-efficacy and outcome expectations may mediate the relationship between STEM career awareness and career interests.

2.7 Conceptual model

This hypothesis explores the direct and indirect relationships between STEM career awareness and STEM career interests, as well as the influence of STEM career awareness on self-efficacy, outcome expectations, and academic performances. The specific hypotheses are:

> *H1*a: There is a direct relationship between STEM career awareness and career interests (Path 1).
>
> *H1*b: STEM career awareness impacts self-efficacy (Path 2), outcome expectations (Path 3), and academic performance (Path 4).
>
> *H2*: This hypothesis investigates the relationships among self-efficacy, outcome expectations, academic performance, and STEM career interests.

The detailed hypotheses are:

> *H2*a: Self-efficacy is related to outcome expectations (Path 5), academic performance (Path 6), and STEM career interests (Path 8).
>
> *H2*b: Outcome expectations influence academic performance (Path 7) and STEM career interests (Path 9).
>
> *H2*c: Academic performance affects STEM career interests (Path 10).
>
> *H3*: This hypothesis examines the multiple mediating roles of self-efficacy, outcome expectations, and academic performance between STEM career awareness and STEM career interests.

The specific mediation paths are:

Mediation paths:

STEM career awareness → Self-efficacy → STEM career interests (2 → 8).

STEM career awareness → Outcome expectations → STEM career interests (3 → 9).

STEM career awareness → Academic performance → STEM career interests (4 → 10).

STEM career awareness → Self-efficacy → Outcome expectations → Academic performance → STEM career interests (2 → 5 → 7 → 10).

STEM career awareness → Self-efficacy → Outcome expectations → STEM career interests (2 → 6 → 10).

STEM career awareness → Self-efficacy → Outcome expectations → Academic performance → STEM career interests (2 → 5 → 9).

STEM career awareness → Outcome expectations → Academic performance → STEM career interests (3 → 7 → 10).

Each hypothesis is designed to fill gaps in the existing literature by providing a comprehensive understanding of the pathways through which STEM career awareness influences STEM career interests. The theoretical justification for these hypotheses is grounded in the SCCT framework and the empirical evidence reviewed.

3 Methodology

3.1 Participants and sample

The study employed purposive sampling, a non-probability technique, to select participants based on predetermined criteria (Ali et al., 2024). Highlighted that purposive sampling involves purposefully selecting study participants who meet specific inclusion and exclusion criteria; this method is based on the premise that individuals with particular backgrounds or experiences can offer insightful and diverse perspectives on the study topic (Abdi and Idris, 2024). In this research, which explores the understudied relationship between reciprocity, satisfaction, and their influence on student career awareness in STEM fields within higher education institutions, purposive sampling was utilized. The study specifically targeted foundation-year students in Mogadishu, Somalia, and conducted a survey across both four private and public universities using a pre-tested questionnaire.

3.2 Instrumentation

This study utilized a structured questionnaire to gather data on career awareness, self-efficacy, outcome expectations, and academic performance among Foundation-year students in Mogadishu. The questionnaire was developed based on validated instruments from previous research in STEM education and was designed to measure each construct using a 5-point Likert scale, ranging from "strongly

disagree" to "strongly agree." The instrument was pre-tested with a small sample to ensure clarity and reliability. The final questionnaire included 25 items, not counting demographic questions and the four key constructs of the study.

3.3 Data collection

Data collection was conducted in person across four universities in Mogadishu, targeting Foundation-year students enrolled in various programs. Foundation-year students were chosen for this study because they are at a pivotal point in their educational journey, making decisions about their academic and career paths. During this period, students are often exposed to new disciplines and are required to make choices that will shape their future studies and careers. A purposive sampling technique was used to select participants who met the study's inclusion criteria. A total of 411 questionnaires were distributed, and 321 completed questionnaires were returned, resulting in a response rate of approximately 78%. The data collection process was carried out over 4 weeks, with researchers ensuring that the confidentiality and anonymity of the participants were maintained throughout the study. Participants' responses were evaluated using a Likert scale with varying degrees of agreement. These students, who undertake preparatory programs before embarking on formal undergraduate studies, are essential for building a solid academic foundation.

3.4 Data analysis

The obtained data were subjected to quantitative analysis using R–Programming for Structural Equation Modeling (SEMinR). SEM syntax allows applied practitioners to use vocabulary that closely resembles their usual modeling concepts (like reflection, composite, and interactions) instead of explicitly stating underlying matrices and co-variances. SEM models can be calculated using either Partial Least Squares Path Modeling (PLS-PM) or SEMinR-facilitated structural equation modeling.

The research model's validation and verification served as the basis for the estimation of the study's measurement and structural models. Convergent and discriminant validity were examined as part of the assessment of the measurement model. Three recognized measures of validity were evaluated in the study using convergent validity: convergent validity (AVE), indicator reliability (indicator factor loadings), and internal consistency (compute reliability, or CR; Bagozzi and Yi, 2012). According to recommendations, each construct's average variance extracted (AVE) should explain more than half of the variance, the indicator loadings should be greater than 0.5, and the composite reliability (CR) should be greater than the minimal threshold of 0.7 (Fornell and Larcker, 1981).

Due to their low scale values, several items were not included in the validation process. This could have been because their factor loadings were weak, measuring less than 0.5, or because their Composite Reliability values were not validated. According to (Hair et al., 2011), the reliability analysis is deemed complete when the CR exceeds the minimum level of 0.70. The instrument was validated through the application of construct validity. The Partial Least Squares (PLS) method of data analysis was used to evaluate the study model, as shown in Figure 1. The R–Programming software package was utilized explicitly for this purpose. According to (Hair et al., 2020), this software can handle non-normal data and offer a comprehensive model solution.

The study employs a correlational research design to examine the relationships between career awareness, self-efficacy, outcome expectations, academic performance, and STEM career interests. Structural Equation Modeling (SEM) was used to quantify the extent to which these predictors contribute to the outcome variable. The model was tested using data collected from 321 Foundation-year students across four universities in Mogadishu. The analysis focused on identifying the strength and direction of the relationships between the predictors and the outcome variable.

4 Results and discussion

4.1 Respondents' demographics

Table 1 offers the attributes of the respondents. According to the gender distribution of students in Somali higher education institutions, the percentage of men (71.1%) was slightly larger than that of Females (29.9%). 68.5% of the respondents were between the ages of 18 and 20. This is a result of the large number of secondary school pupils who have registered in colleges and universities in recent years. A little over 81.3% of students choose to major in science.

4.2 Descriptive statistics

In order to address the features of the respondents' responses, descriptive statistics were applied. The descriptive statistical data include the mean, standard deviation, skewness, and kurtosis (Wijaya et al., 2022). Descriptive statistics findings are shown in Table 2.

The average of the respondents' answers to each items was 321, with variable OE4 (3.41) having the highest average and variable OE1 (2.97) having the lowest. This means that most of the relative answers were positive responses. In the pattern for the average of each item in each construct, the average value was not significantly different. This pattern also occurred in the standard deviation. According to the previous study, the limit for skewness and kurtosis was |2.3|; therefore, based on Table 2, skewness and kurtosis were within the acceptable value range.

4.3 Measurement model

According to Hair et al. (2011), The initial evaluation of the measurement model aimed to assess the factor loadings, as well as the validity and reliability of the concepts. The analysis was conducted using 25 items. Following this evaluation, it was found that all factor loadings exceeded the recommended threshold of 0.600, with the exception of two items. These two items were removed as they did not meet the required criteria. Therefore, every question was included in the final assessment process (Table 3; Figure 2). All of the constructs' composite dependability and Average Variance Extracted (AVE) are either larger than or equal to the corresponding thresholds of 0.50 and 0.70.

Therefore, it is clear that convergent validity and dependability have been confirmed. Furthermore, Table 4 displays the results of the

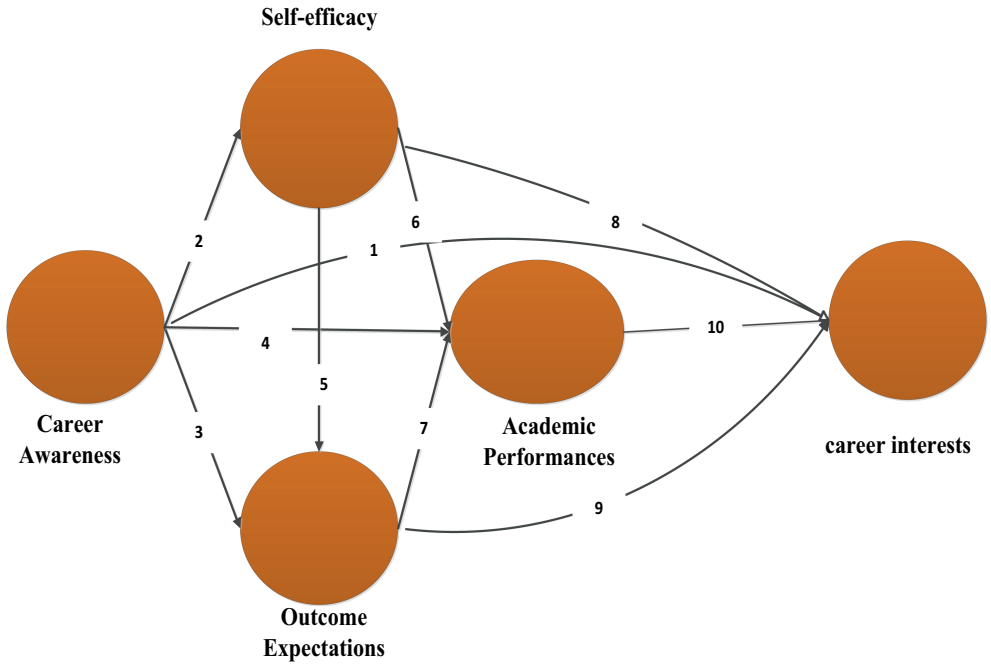

FIGURE 1
Conceptual model.

discriminant validity using the Fornell and Larcker (1981) approach. A construct is considered acceptable in the associated columns and rows if its diagonal values exceed its non-diagonal values (Hair et al., 2020). Table 4 illustrates how discriminant validity has been demonstrated by the fact that all diagonal values are more significant than non-diagonal values. The diagonal bold values for each construct represent the square root of the AVE, indicating the discriminant validity (Hair et al., 2017).

The values for all constructs are more significant than 0.50 (Hair et al., 2017). Next, we examined the Heterotrait Monotrait ratio (HTMT) in Table 5, which also shows that the constructs' values are not greater than 0.85 or 0.9, showing that they have discriminant validity for the HTMT ratio.

TABLE 1 Demographics of respondents.

Variable	Response category	Frequency percent (%)
Gender	Male	228 (71%)
	Female	93 (29.%)
Age	18–20	220 (68.5%)
	20–22	61 (19%)
	22+	40 (12.5%)
Specialization	Arte	60 (18.7%)
	Science	261 (81.3%)

4.4 Hypothesis test

The structural model was analyzed using the bootstrap method in PLS-SEM (Partial Least Squares Structural Equation Modeling), where the path coefficient serves as a standardized regression coefficient (beta) to assess the structural model and hypotheses. It indicates the direct relationship between an independent variable and a dependent variable.

Based on the significance level of $p = 0.05$ and the usage of a 95% confidence interval, the interpretation of the standardized path coefficient values presented in Table 6 indicates the confirmation or rejection of the hypotheses as follows:

Statistically significant relationships ($p < 0.05$): When the confidence interval excludes zero, this suggests a statistically significant relationship between the factors. In such cases, we confirm the hypotheses based on the standardized path coefficient values.

Statistically insignificant relationships ($p > 0.05$): If the confidence interval includes zero, this implies that there is no statistically significant distinction between the factors. In these instances, the hypotheses are not supported based on the standardized path coefficient values (Dalmasso et al., 2020).

The direct impact of STEM career awareness on career interests was examined in the study. The results indicated that the direct relationship between STEM career awareness and STEM career interests is inconclusive. Specifically, the analysis revealed that STEM career awareness did not exhibit a significant direct effect ($\beta = -0.008$, 95% CI [−0.119, 0.115], $p > 0.05$). The inclusion of zero within this confidence interval implies that there is no statistically significant distinction between STEM career awareness and STEM career interests at the 95% confidence level H1a.

TABLE 2 Descriptive statistics.

Variables	Items	Mean	Std. Dev	Skewness	Kurtosis
		Statistics	Statistics	Statistics	Statistics
STEM Career Awareness	CA1	3.14	1.497	−0.228	−1.346
	CA2	3.2	1.42	−0.224	−1.2
	CA3	3.16	1.332	−0.183	−1.072
	CA4	3.07	1.328	−0.126	−1.12
	CA5	3.13	1.341	−0.244	−1.019
Self-efficacy	SE1	2.97	1.397	−0.118	−1.278
	SE2	3.17	1.362	−0.038	−1.171
	SE3	3.15	1.299	−0.154	−0.945
	SE4	3.18	1.436	−0.31	−1.192
Outcome Expectations	OE1	2.97	1.27	−0.015	−1.086
	OE2	3.18	1.344	−0.233	−1.088
	OE3	3.3	1.21	−0.255	−0.815
	OE4	3.41	1.285	−0.473	−0.73
Academic Performance	AP1	3.12	1.218	−0.024	−0.927
	AP2	3.2	1.064	−0.344	−0.362
	AP3	3.28	1.252	−0.217	−0.899
	AP4	3.25	1.154	−0.066	−0.739
	AP5	3.21	1.166	−0.235	−0.829
STEM career interests	CI1	3.26	1.202	−0.147	−0.881
	CI2	3.18	1.104	−0.294	−0.467
	CI3	3.21	1.282	−0.324	−0.937
	CI4	3.05	1.301	−0.135	−0.982
	CI5	3.26	1.363	−0.317	−1.161

On the contrary, STEM career awareness demonstrated significant direct influences on self-efficacy, outcome expectations, and academic performance. Notably, self-efficacy ($\beta = 0.707$, 95% CI [0.637, 0.776], $p < 0.005$), outcome expectations ($\beta = 0.286$, 95% CI [0.145, 0.434], $p < 0.005$), and another factor ($\beta = 0.23$, 95% CI [0.093, 0.38], $p < 0.005$) were positively associated with STEM career interests. The absence of zero within these intervals suggests a statistically significant relationship between these factors. These results support the hypothesis under investigation H1b.

When investigating the connections between self-efficacy to outcome expectations, academic performances, and career interests (illustrated by paths 5, 6, 8) H2a. We can see SE→OE: The path coefficient for self-efficacy (SE) influencing outcome expectations (OE) is 0.558, with a bootstrap mean of 0.56 and a standard deviation of 0.071. The *t*-statistic is 7.837, and the 95% confidence interval ranges from 0.416 to 0.694. This relationship is supported.

SE→AP: The direct effect of self-efficacy (SE) on academic performance (AP) yields a path coefficient of 0.37, a bootstrap mean of 0.369, and a standard deviation of 0.081. The *t*-statistic is 4.568, and the 95% confidence interval spans from 0.21 to 0.527. This connection is supported.

SE→CI: When examining the impact of self-efficacy (SE) on STEM career interests (CI), the path coefficient is 0.117, with a bootstrap mean of 0.113 and a standard deviation of 0.088. The *t*-statistic is 1.328, and the 95% confidence interval ranges from −0.06 to 0.287. This relationship is not supported.

> *H*2b: The examination focuses on the impact of outcome expectations (OE) on academic performances (AP) and STEM career interests (CI), as indicated by paths 7 and 9.

OE→AP: The path coefficient for outcome expectations (OE) influencing academic performances (AP) is 0.214, with a bootstrap mean of 0.214 and a standard deviation of 0.087. The *t*-statistic is 2.468, and the 95% confidence interval ranges from 0.041 to 0.381. This relationship is supported.

OE→CI: The direct effect of outcome expectations (OE) on STEM career interests (CI) reveals a path coefficient of 0.161, with a bootstrap mean of 0.167 and a standard deviation of 0.079. The *t*-statistic is 2.034, and the 95% confidence interval spans from 0.016 to 0.322. This connection is also supported.

> *H*2d: The analysis investigates the influence of academic performances (AP) on STEM career interests (CI) represented by path 10.

AP→CI: The path coefficient for academic performances (AP) affecting STEM career interests (CI) is 0.594, with a bootstrap mean

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TABLE 3 Factor loadings, reliability, and convergent validity.

Variable	Items	Loadings	Alpha	rho	AVE	RhoA
STEM Career Awareness	CA1	0.758	0.806	0.866	0.564	0.808
	CA2	0.688				
	CA3	0.759				
	CA4	0.765				
	CA5	0.781				
Self-efficacy	Se1	0.779	0.782	0.859	0.604	0.785
	Se2	0.754				
	Se3	0.764				
	Se4	0.81				
Outcome Expectations	OE1	0.697	0.791	0.865	0.616	0.797
	OE2	0.816				
	OE3	0.805				
	OE4	0.815				
Academic Performance	AP1	0.832	0.868	0.904	0.654	0.869
	AP2	0.79				
	AP3	0.811				
	AP4	0.804				
	AP5	0.805				
STEM career interests	CI1	0.833	0.854	0.896	0.633	0.862
	CI2	0.736				
	CI3	0.761				
	CI4	0.771				
	CI5	0.871				

of 0.59 and a standard deviation of 0.078. The *t*-statistic is 7.65, and the 95% confidence interval ranges from 0.424 to 0.729. This relationship is supported.

> *H*3a: The investigation delves into the multiple mediating roles of self-efficacy, outcome expectations, and academic performances between STEM career awareness (CA) and career interests (CI), with paths: $2 \rightarrow 8$; $3 \rightarrow 9$; $4 \rightarrow 10$; $2 \rightarrow 5 \rightarrow 7 \rightarrow 10$, $2 \rightarrow 6 \rightarrow 10$; $2 \rightarrow 5 \rightarrow 9$; $3 \rightarrow 7 \rightarrow 10$.

CA→SE→CI: The path coefficient for STEM career awareness (CA) influencing self-efficacy (SE) and subsequently impacting career interests (CI) is 0.083. The *t*-statistic is 1.325, and the 95% confidence interval ranges from −0.044 to 0.201. This relationship is "Not Supported."

CA→OE→CI: STEM career awareness (CA) influencing outcome expectations (OE) and subsequently affecting career interests (CI) yields a path coefficient of 0.046. The *t*-statistic is 1.809, and the 95% confidence interval ranges from 0.004 to 0.103. This relationship is "Supported."

CA→AP→CI: The direct effect of STEM career awareness (CA) on academic performances (AP) and its impact on STEM career interests (CI) results in a path coefficient of 0.136. The *t*-statistic is 2.765, and the 95% confidence interval ranges from 0.05 to 0.242. This relationship is "Supported."

CA→SE→OE→AP→CI: The direct effect of STEM career awareness (CA) on self-efficacy (SE), then on outcome expectations (OE), academic performances (AP), and finally on STEM career interests (CI) yields a path coefficient of 0.05. The *t*-statistic is 2.27, and the 95% confidence interval ranges from 0.01 to 0.10. This relationship is "Supported."

CA→SE→AP→CI: STEM career awareness (CA) directly influences self-efficacy (SE), then academic performances (AP), and subsequently career interests (CI) with a path coefficient of 0.155. The *t*-statistic is 4.171, and the 95% confidence interval ranges from 0.088 to 0.233. This relationship is "Supported."

CA→SE→OE→CI: The impact of STEM career awareness (CA) on self-efficacy (SE), then on outcome expectations (OE), and finally on STEM career interests (CI) results in a path coefficient of 0.064. The *t*-statistic is 1.851, and the 95% confidence interval ranges from 0.006 to 0.140. This relationship is "Not Supported."

CA→OE→AP→CI: STEM career awareness (CA) influencing outcome expectations (OE), then academic performances (AP), and finally career interests (CI) yields a path coefficient of 0.036. The *t*-statistic is 1.977, and the 95% confidence interval ranges from 0.005 to 0.077. This relationship is "Supported."

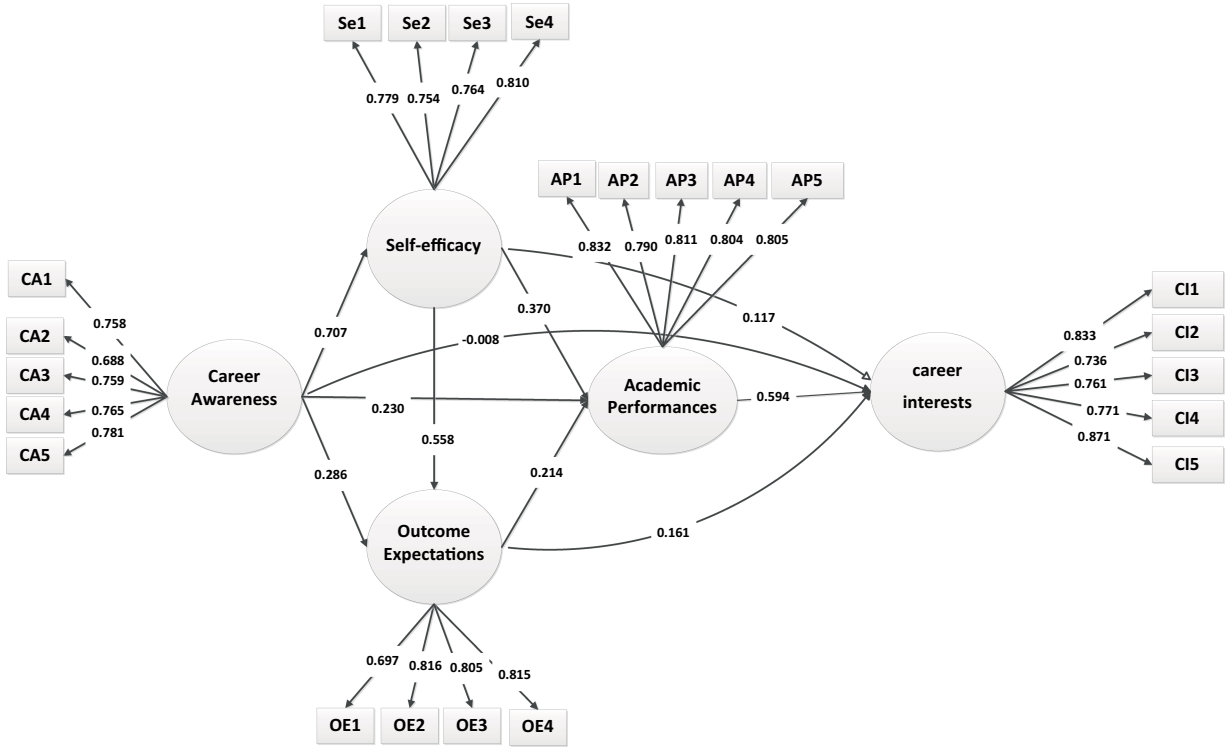

FIGURE 2
Measurement model.

TABLE 4 Discriminant validity (Fornell-Larcker criterion).

	STEM career awareness	Self-efficacy	Outcome expectations	Academic performance	STEM career interests
STEM Career Awareness	**0.751**				
Self-efficacy	0.707	**0.777**			
Outcome Expectations	0.681	0.760	**0.785**		
Academic Performance	0.637	0.695	0.652	**0.809**	
STEM career interests	0.563	0.647	0.632	0.775	**0.796**

The bold values along the diagonal represent the square root of the Average Variance Extracted (AVE) for each construct, which should be greater than the corresponding correlations between constructs to confirm discriminant validity.

5 Discussion

The study aimed to investigate the influence of career awareness on STEM career interests among Foundation-year students in Mogadishu, Somalia. The findings reveal intricate relationships between various factors and shed light on the complexities involved in shaping students' career aspirations in STEM fields.

Direct Relationship between STEM Career Awareness and Career Interests: The direct link between STEM career awareness and STEM career interests, although not statistically significant, hints at a potential relationship that other factors may mediate. This suggests that while awareness is essential, it may not be the sole driver of career interests.

Role of Self-Efficacy in Career Aspirations: Self-efficacy emerges as a critical factor influencing students' career interests. The positive association between STEM career awareness and self-efficacy underscores the importance of fostering a belief in one's abilities to pursue STEM careers.

Impact of Outcome Expectations on Career Choices: Positive outcome expectations are found to influence both academic performances and STEM career interests. This highlights the role of perceived rewards and benefits in shaping students' career aspirations.

Significance of Academic Performances in Career Decision-making: Academic performances are shown to impact STEM career interests directly. This underscores the importance of educational success in influencing students' career paths and aspirations.

Mediating Roles of Self-Efficacy, Outcome Expectations, and Academic Performances: The study identifies self-efficacy, outcome expectations, and academic performances as mediating factors between STEM career awareness and career interests. These factors play crucial roles in shaping students' perceptions and motivations toward STEM fields.

TABLE 5 Heterotrait monotrait ratio (HTMT).

	STEM career awareness	Self-efficacy	Outcome expectations	Academic performance	STEM career interests
STEM Career Awareness					
Self-efficacy	0.847				
Outcome Expectations	0.836	0.835			
Academic Performance	0.761	0.827	0.7834		
STEM career interests	0.672	0.783	0.7601	0.835	

TABLE 6 Results of path analysis.

Hyo	Path	Original Est.	Bootstrap mean	Bootstrap SD	T Stat.	95% CI		Sig
						Lower	Upper	
H1a	CA→CI	−0.008	−0.006	0.06	−0.126	−0.119	0.116	Not Support
	CA→SE	0.707	0.71	0.036	19.911	0.637	0.776	Support
H1b	CA→OE	0.286	0.286	0.075	3.827	0.145	0.434	Support
	CA→AP	0.230	0.231	0.072	3.177	0.093	0.38	Support
	SE→OE	0.558	0.56	0.071	7.837	0.416	0.694	Support
H2a	SE→AP	0.370	0.369	0.081	4.568	0.21	0.527	Support
	SE→CI	0.117	0.113	0.088	1.328	−0.06	0.287	Not Support
	OE→AP	0.214	0.214	0.087	2.468	0.041	0.381	Support
H2b	OE→CI	0.161	0.167	0.079	2.034	0.016	0.322	Support
H2c	AP→CI	0.594	0.59	0.078	7.65	0.424	0.729	Support
	CA→Se→CI	0.083	0.080	0.062	1.325	−0.044	0.201	Not Support
	CA→Se→OE→AP→CI	0.05	0.05	0.02	2.27	0.01	0.10	Support
	CA→SE→AP→CI	0.155	0.154	0.037	4.171	0.088	0.233	Support
H3	CA→Se→OE→CI	0.064	0.067	0.034	1.851	0.006	0.140	
	CA→OE→CI	0.046	0.047	0.025	1.809	0.004	0.103	Support
	CA→AP→CI	0.136	0.137	0.049	2.765	0.05	0.242	Support
	CA→OE→AP→CI	0.036	0.036	0.018	1.977	0.005	0.077	Support

Implications for Career Guidance and Educational Practices: Strategies aimed at enhancing self-efficacy can positively influence students' career interests in STEM fields. Emphasizing positive outcome expectations and highlighting the potential rewards of pursuing STEM careers can motivate students and increase their interest in these fields. Supporting academic excellence through tailored educational interventions can have a significant impact on students' career aspirations in STEM.

The study's focus on Foundation-year students in Mogadishu limits the generalizability of the findings. Future research could explore additional factors influencing STEM career interests and consider longitudinal studies to track changes in students' aspirations over time.

The study contributes to the existing literature by highlighting the intricate relationships between career awareness, self-efficacy, outcome expectations, and academic performances in shaping STEM career interests among students. The findings offer theoretical insights into the multifaceted nature of factors influencing career aspirations. From a practical standpoint, the study underscores the importance of tailored interventions aimed at enhancing self-efficacy, promoting positive outcome expectations, and supporting academic excellence to nurture students' interest in STEM fields effectively.

The sample used in this study is heavily skewed toward students who have already chosen to major in science, with 81.3% of the participants pursuing STEM fields. However, this skewed sample offers a unique opportunity to examine how career awareness, self-efficacy, and outcome expectations further shape the interests of students who are already on a STEM pathway. Understanding these relationships within a STEM-oriented population can provide insights into the factors that strengthen or weaken commitment to STEM careers among students who have initially chosen this field.

The findings of this study highlight the importance of self-efficacy as a significant predictor of STEM career interests among Foundation-year students in Mogadishu. The positive correlation between self-efficacy and STEM career interests suggests that students who believe in their abilities are more likely to pursue careers in STEM fields. Similarly, the positive contributions of outcome expectations and academic performance to STEM career interests indicate that students

who anticipate favorable outcomes and perform well academically are more inclined to choose STEM careers. However, the lack of a statistically significant direct correlation between career awareness and STEM career interests suggests that simply being aware of STEM careers may not be sufficient to influence students' career choices without the presence of strong self-efficacy and positive outcome expectations.

6 Conclusion

In conclusion, the study underscores the significance of self-efficacy, outcome expectations, and academic performances in mediating the relationship between career awareness and STEM career interests among Foundation-year students. Understanding and leveraging these factors are crucial for designing targeted interventions and educational programs to cultivate a diverse and skilled STEM workforce. While the study's findings provide valuable insights, further research is needed to explore additional influencing factors and validate the results across varied student populations. Ultimately, this study contributes to the ongoing discourse on promoting STEM career interests among students, paving the way for informed strategies to inspire and empower the next generation of STEM professionals.

6.1 Limitations

While this study provides valuable insights into the factors influencing STEM career interests among Foundation-year students in Mogadishu, it is not without limitations. First, the study's focus on a specific student population in a single city limits the generalizability of the findings to other contexts. Additionally, the sample used in this study is heavily skewed toward students who have already chosen to major in science, with 81.3% of participants pursuing STEM fields. This skewness may influence the observed relationships between career awareness and career interests and limit the applicability of the findings to a broader range of students.

Moreover, the cross-sectional design of the study does not allow for the examination of changes in students' attitudes and aspirations over time. Future research could address these limitations by employing a longitudinal design and expanding the study to include a more diverse and balanced sample from different regions and academic interests.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding authors.

Ethics statement

The studies involving humans were approved by SIMAD University Mogadishu, Somalia. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AA: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. AM: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. AO: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. CA: Conceptualization, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing. MO: Conceptualization, Investigation, Methodology, Software, Supervision, Writing – original draft, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. The authors thank SIMAD University for funding this study under the Research Grant Scheme (Revitalizing stem education in post-conflict Somalia: the role of higher education in developing hands-on and experiential learning opportunities) with Grant No: SU-STEM-2023-005. The authors also thank all the respondents of this research.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2024.1484761/full#supplementary-material

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