FACTORS INFLUENCING PROBLEM-SOLVING COMPETENCE IN STEM EDUCATION: GENDER-BASED INSIGHTS FROM HIGH SCHOOL STUDENTS IN QUANG TRI PROVINCE

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Abstract

The present study investigates the factors influencing problem-solving competence in STEM educational systems amongst 700 secondary school students in Quang Tri Province, taking into account gender inclusion. A self-administered survey with established validity was used to measure five distinct aspects: STEM Interest, STEM Self-Efficacy, Teacher Support, Peer Collaboration, and Access to Resources. Exploratory factor analysis and regression modeling indicated that problem-solving competence is significantly predicted by STEM Interest ($\beta = 0.38$, $p < 0.001$) and STEM Self-Efficacy ($\beta = 0.31$, $p < 0.001$), the two factors accounting for 52% of the variation in the dependent variable. Gender differences showed males reported more STEM Self-Efficacy ($t = 3.21$, $p < 0.01$), while females had more Teacher Support ($t = -3.78$, $p < 0.001$). Further regression showed that for males, the factor of STEM self-efficacy was predicted, while teacher support and peer collaboration were more predictive in females. Qualitative focus group data enriched these findings, revealing themes such as perceived biases, resource constraints, and the importance of collaborative environments. This supports creating different strategies in STEM education as there are variations based on gender. This implies that building self-efficacy in the female gender and constructing conducive, cooperative settings in the male gender would enhance problem-solving competence in both genders. This study investigates the practical aspects of responsive STEM education targeting gender equality in skill acquisition.

Keywords: *Competence, gender, problem-solving, STEM.*

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CÁC YẾU TỐ TÁC ĐỘNG ĐẾN NĂNG LỰC GIẢI QUYẾT VẤN ĐỀ TRONG GIÁO DỤC STEM: CHÚ TRỌNG PHÂN TÍCH KHÁC BIỆT VỀ GIỚI ĐỐI VỚI HỌC SINH TRUNG HỌC PHỒ THÔNG TỈNH QUẢNG TRỊ

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Tóm tắt

Nghiên cứu này khám phá các yếu tố tác động đến năng lực giải quyết vấn đề trong bối cảnh giáo dục STEM đối với 700 học sinh trung học phổ thông trên địa bàn tỉnh Quảng Trị, trong đó chú trọng phân tích yếu tố khác biệt về giới. Một cuộc khảo sát với độ tin cậy cao đã được triển khai để đo lường năm yếu tố chính gồm: Hứng thú với STEM, Tự tin trong STEM, Hỗ trợ từ giáo viên, Hợp tác với bạn bè, và Tiếp cận nguồn tài nguyên học liệu. Kết quả phân tích nhân tố khám phá (EFA) và hồi quy chỉ ra rằng năng lực giải quyết vấn đề chịu tác động mạnh mẽ từ yếu tố Hứng thú với STEM ($\beta = 0,38$, $p < 0,001$) và Tự tin trong STEM ($\beta = 0,31$, $p < 0,001$), chiếm 52% sự biến thiên của biến phụ thuộc. Ngoài ra, phân tích chỉ ra sự khác biệt về giới rõ rệt: nam sinh có mức tự tin trong STEM cao hơn ($t = 3,21$, $p < 0,01$), trong khi nữ sinh nhận được sự hỗ trợ từ giáo viên nhiều hơn ($t = -3,78$, $p < 0,001$). Phân tích hồi quy chuyên sâu cho thấy yếu tố Tự tin trong STEM là nhân tố dự báo quan trọng đối với nam sinh, trong khi Hỗ trợ từ giáo viên và Hợp tác với bạn bè có tác động mạnh đối với nữ sinh. Dữ liệu định tính của nhóm tập trung cũng khẳng định thêm những phát hiện này, cho thấy tác động của thành kiến nhận thức, hạn chế về nguồn lực và tầm quan trọng của môi trường hợp tác. Kết quả này gợi ý về tầm quan trọng của việc thiết kế các chiến lược giáo dục STEM theo hướng tiếp cận khác biệt giới, trong đó tăng cường xây dựng tự tin cho nữ sinh và phát triển môi trường hợp tác cho nam sinh để cải thiện năng lực giải quyết vấn đề cho cả hai giới. Bài nghiên cứu này cung cấp cơ sở cho các sáng kiến tổ chức giáo dục STEM hướng tới mục tiêu bình đẳng giới trong phát triển năng lực.

Từ khóa: *Giải quyết vấn đề, giới tính, năng lực, STEM.*

1. Introduction

STEM education (Science, Technology, Engineering, and Mathematics) is fundamental to equipping learners with analytical and problem-solving capabilities that are essential in the modern world. Problem-solving competence as an integral STEM component does not only improve academic performance. It also prepares students for careers associated with new ideas and research (Bybee, 2013; Honey, Pearson, & Schweingruber, 2014). Unfortunately, implementation of the same technologies in classrooms presents inequalities of skills, mainly attributed to gender, which is still a persistent problem in most of the education systems across the globe (Tandrayen-Ragoobur & Gokulsing, 2022). In Vietnam, education reforms have paid attention to STEM application. However, there is little concern about the aspects that enhance problem-solving skills, particularly in the more remote regions like Quang Tri Province.

Understanding the role of self-efficacy, interest, educational support, etc., in enhancing problem-solving skills has been emphasized in previous scholarship (Rittmayer& Beier, 2008; Zeldin & Pajares, 2000), but little attention has been paid to conducting investigations focused on these factors in the context of rural high schools in Vietnam. Furthermore, although gender inequities in STEM research fields have received substantial attention, few of them analyze how factors on gender correlate with problem-solving competence in the region under study. Therefore, this provides a basis for why educationists need to examine the relationship between gender and the relevant features of STEM (De las Cuevas et al., 2022; Patrick et al., 2009).

This study addresses the above research issues by investigating the attributes that contribute to the problem-solving competence of students in high school settings in Quang Tri Province, focusing on gender-related attributes as well. Therefore, to its aims, this study raises two specific research questions:

(1) What are the major contributing factors of problem-solving competence in STEM education for high school students in Quang Tri Province?

(2) Do these factors affect male and female students differently?

Unlike earlier research, we assess various predictors, i.e., STEM interest, self-efficacy, teacher support, peer collaboration, and access to resources, to evaluate their combined and gender-related effects.

The goal is to present evidence that will facilitate the development of gender-sensitive STEM programs for teachers and policymakers. This work has been done to enrich the contribution of literature with diverse methodological techniques, namely exploratory factor analysis and regression modelling, that could address specific important proposals related to the fostering of STEM equity in all students (Iwuanyanwu, 2020; Kuchynka et al., 2022).

2. Literature review

Most of the research on STEM education is targeted at its role in developing problem-solving abilities among students and preparing them for a knowledge society. Moreover, there is a large body of research in which self-efficacy, interest, and external support are linked to students' problem-solving competencies, while significant differences are found in the context of STEM between men and women regarding participation and performance (Syed et al., 2019; Halim et al., 2023). This literature review is used to assess the recent research on the determinants of the ability to solve problems with an emphasis on subjects of STEM, in which specific focus on issues of gender and gaps may be found toward achieving balanced access and equity in educational outcomes.

2.1. Key Factors Influencing Problem-Solving Competence in STEM

STEM education has long been able to help students acquire critical problem-solving skills. Interest and self-efficacy in STEM have been found to consistently create the necessary paths toward overcoming such skills deficiency. Interest in STEM-enthusiasm and involvement in STEM subjects have been shown to boost profound involvement with the content and thus foster performance in problem-solving (Cooper & Heaverlo, 2013; LaForce et al., 2017). Likewise, Self-Efficacy, or the belief that one has just the right abilities, is strong in predicting persistence and success on STEM tasks (Bandura, 1977; Brown et al., 2016). Thus, those students who tend to believe so much in what they can do are less likely to avoid problems, and they show resilience to some extent.

However, outside assistance also plays a significant role in improving problem-solving skills. Student motivation and self-efficacy, by way of Teacher Support and specifically for females, may stem from the bias of STEM systemic disparities (Liu, 2021). Peer collaboration encourages cooperative problem-solving through critical thinking, where students will be able to capitalize on each other's strengths (Jordan & McDaniel, 2014). Resources refer to instructional materials, laboratory equipment, and technology. Unequal distribution of resources, especially in rural areas, has been reported as a barrier to the development of STEM skills (Sithole et al., 2017). Furthermore, Access to Resources is a crucial construct since problem-solving ability decreases in students who do not have adequate exposure to STEM resources such as materials, technology, or laboratory apparatus. Access to technology resources is even more complex in specific rural set-ups where the development of STEM competence among such students cannot be at par with their counterparts in towns (Machi, 2009). It is critical to address these inequities in resource access in order to create fair STEM education.

2.2. Gender Differences and STEM Education

Furthermore, there are significant inequalities regarding participation and achievement in the STEM areas. Males usually report higher levels of self-efficacy about STEM and also tend to perform better in problem-solving tasks (Wang & Degol, 2017). Female participants, on the other hand, gain more from forces like teacher mentorship and peer networks that are supportive and collaborative (Zeldin et al., 2008).

Cultural and social expectations greatly influence the size of these gaps. Girl students are stereotyped as unqualified to build confidence and interest in the area, whereas male students feel encouraged to pursue excellence in these fields. Some interventions, including mentorship initiatives and gender-focused STEM programs, have worked toward addressing inequality; however, interventions are insufficient. Many educational systems do not incorporate the principles of God in the learning quest, resulting in students being partly prepared in STEM areas (Nord, 2014). Gender differences in access to, participation in, and performance in STEM education therefore call for policy measures and changes in the curricula, which in particular encourage women to take up STEM in active stages and build their confidence. Therefore, such issues demand special consideration, such as special mentorship programs and improved curriculum designs to yield equitable learning environments.

2.3. Future Research Directions

These factors are integrated into one conceptual framework to point out their joint and also gender-specific effects on problem-solving competence. The framework positions the following five important factors taken as a part of, and in the development, the problem-solving competence involvement: STEM Interest, self-efficacy, aspects on teacher and peer support, and ultimately, resource availability. It purports that gender would take place because differences regarding how they are perceived as important for males and females are likely to be affected by gender, such as those referring to individual and environmental characteristics and gender-specific educational experiences (Wang & Degol, 2017; Liu et al., 2021).

Most of the studies are focused either on urban or international places; little consideration has been given to the rural context, as found in the works of Blackburn (2024) and Le et al. (2024). Gender, self-efficacy, and interest are all interdependent in a number of ways (Srinivasan, 2017). Although cultural factors of self-efficacy are important, they do limit generalization. Few studies have documented recommendations that are actionable in relation to distinctive adverse conditions faced by female students in rural areas, which face much worse mention compounded by socioeconomic differences.

It has taken long from recognizing as much as is known about STEM problem-solving capacity to really needing gender-responsive teaching interventions that would be appropriate for overcoming resource constraints and cultural barriers. These interventions should comprise the creation of learning environments supportive to alleviate systematic disadvantages for female students. Furthermore, we need to broaden our research in order to represent different rural contexts, which would increase the generalizability of findings and reveal additional problems that may be hidden within an urban perspective. Further, longitudinal studies would be significant in tracking the development of problem-solving competence over time, particularly for the effectiveness of targeted interventions that have been carefully designed and implemented. These approaches would significantly advance the field and contribute to more equitable STEM practices.

Hypotheses:

H1: STEM Interest and Self-Efficacy are positively associated with problem-solving competence. These constructs collectively enhance students' abilities to engage with and solve complex problems (Bandura, 1977; Cooper & Heaverlo, 2013).

H2: In the female student group, teacher support and peer collaboration showed the size of the most significant effect on problem-solving competence. The emotional conditions that support female students themselves allow the students to carry out collaborative work and thus foster the building of confidence in their competence (Liu et al., 2021; Zeldin et al., 2008).

H3: On the contrary, STEM self-efficacy is stronger than the prior one concerning problem-solving competence for male students. Males depend more on perceptions of their capabilities to cope with the challenges of STEM, as related findings match the gender-related confidence gaps in STEM (Wegemer & Eccles, 2019; Wang & Degol, 2017).

This integrated framework and future directions will begin to expand on more complex interactions among aspects of the STEM education process and problem-solving competence in rural Vietnam and, subsequently, much of the education sector as a point of action for teachers and policy-makers.

3. Materials and Methods

3.1. Research Design

This study has used a mixed-method approach to explore high school students' problem-solving competence in STEM education within Quang Tri province. Such an approach uses both quantitative and qualitative methods, allowing the students to carry out a comprehensive investigation of the relations between self-efficacy, interest, and support from others, besides their differences across gender. An independent quantitative and qualitative research design has been developed through survey results with focus group interviews to enrich contextual research findings.

3.2. Sampling

The subjects for this study are high school students of grades 10-12 in Quang Tri Province. A stratified random sampling method has been used to ensure that the lot is representative. The strata would include grade levels, such as 10th, 11th, and 12th grades, and gender, such as male and female, since these are considered to capture variations in exposure to STEM education, along with capturing developmental stages. Schools are to be selected from different geographic areas, including urban, suburban, and rural, in order to take into account differences due to socioeconomic status and resources. This stratification served as a means of improving the generalizability of study results across different educational contexts within the province.

The main tool of quantitative data collection is a structured questionnaire. This survey measures key variables such as interest in STEM subjects, self-efficacy in them, teacher support, peer collaboration, and access to resources. The questionnaire has been adapted from the already validated scales used in prior studies to include: Science Motivation Questionnaire II (Glynn et al., 2009), Self-Efficacy for Learning and Performance Questionnaire (Lodewyk & Winne, 2005), Perceived Teacher Support Scale (Liu et al., 2021), Collaborative Problem-Solving Scale (Snyder & Snyder, 2008).

A pilot test of more than 50 students was done in a school that was not part of the sampling to confirm reliability. For this study, Cronbach's alpha for all constructs exceeds 0.70, hence showing satisfactory internal consistency. Some wordings in the items have been slightly modified to suit better comprehension within the local context.

3.3. Data Collection Procedures

Quantitative data was collected through supervised delivery of the questionnaire. The students were completely surveyed to ensure that they got the same administered supervised and independent from external interferences. Each student independently filled in the survey.

Qualitative data collection was done through focus group interviews with a subsample of 60 students who volunteered after responding to the survey. In this respect, the distribution by gender allowed subtle insights to be realized. Each focus group interview lasted about 45 minutes and was led by a professional moderator. Discussions followed a semi-structured protocol that covered experiences, challenges, and gendered perceptions vis-à-vis STEM education. Audio recordings were transcribed word by word for analysis.

The quantitative data provided statistical significance regarding the relationship of essential variables with problem-solving competence. On the other hand, qualitative data provided richness by inciting the contextual and experiential dimensions for explaining such observed patterns. For example, regression results pointed to gender differences in self-efficacy, or the qualitative discussion disclosed the sociocultural influences on the levels of confidence in the subject areas of science, technology, engineering, and mathematics.

3.4. Data Analysis

Quantitative data analysis was done using SPSS 27.0. It involved descriptive statistics describing the sample, whereas independent samples t-tests and multiple linear regression were used to draw inferences about significant predictors and differences by gender. Confirmatory factor analysis was applied to confirm the structure of the constructs.

The NVivo program was used to analyze qualitative data through thematic analysis. The process included: Researchers repeatedly read the transcripts to gain an in-depth understanding; Initial codes were assigned to meaningful segments of text based on the research questions and emergent themes; Codes have been integrated into demonstrated samplings that include but are not limited to 'apprehended barriers', 'role of teacher support', and 'gendered perceptions of STEM'; They were taken through rounds of re-review to ensure strong coherence within themes and the data; Linking themes into quantitative findings provides for a holistic narrative of the factors affecting one's problem-solving competence.

Informed consent was obtained from participants and their guardians, mentioning confidentiality and the right to withdraw at any time. All that ensured some ethical research standards and safeguarded participants' well-being.

4. Results

Sample Demographics and Preliminary Data Analysis

The sample was selected from 700 high school students from Quang Tri Province, ranging from grades 10th to 12th. Of these, 358 (51.1%) were female, and 342 (48.9%) were male, ensuring balanced gender representation. To analyze the factors influencing problem-solving competence in STEM, an initial reliability check was conducted using Cronbach’s Alpha. Factors with an Alpha above 0.70 were retained for further analysis.

Research Question 1: Main Factors Influencing Problem-Solving Competence in STEM Education

Through its analysis, the EFA revealed that all five significant factors explaining the competence of an individual in problem-solving were STEM interest, STEM self-efficacy, teacher support, peer collaboration, and access to resources. The Kaiser-Meyer-Olkin measure indicates that the sampling is adequate, with KMO = 0.876, while Bartlett's test of sphericity states that data are appropriate for factor analysis, $p < 0.001$. Factor loadings for the five constructs were found to have a range of 0.68 to 0.89. In contrast, the total variance explained by these factors was 72.4%, with STEM Interest and STEM Self-Efficacy contributing the most significant shares (28.3% and 19.1%, respectively).

A multiple linear regression analysis was conducted to determine how much the factors predict problem-solving competence. The model was significant and explained 52% of the variance ($R^2 = 0.52$, $p < 0.001$). Table 1 presents the standardized beta coefficients and significance levels:

Table 1. Influencing Factors in STEM Problem-Solving Competence

Factor	Standardized Beta (β)	p-value	Significance (p-value)
STEM Interest	0.38	6.87	< 0.001
STEM Self-Efficacy	0.31	5.72	< 0.001
Teacher Support	0.25	4.31	< 0.001
Peer Collaboration	0.19	2.91	< 0.05
Access to Resources	0.15	2.34	< 0.05

Findings here showed that STEM interest and self-efficacy proved to be the best predictors of problem-solving competence, followed by teacher support.

Research Question 2: Gender Differences in Influencing Factors

Independent sample t-tests were conducted for each factor to explore gender-based differences. Table 2 presents the mean scores of male and female students for each factor, along with the p-values.

Table 2. Gender Differences in Influencing Factors

Factor	Male (Mean ± SD)	Female (Mean ± SD)	t-value	Significance (p-value)
STEM Interest	4.12 ± 0.72	4.09 ± 0.68	0.45	0.65
STEM Self-Efficacy	3.87 ± 0.78	3.65 ± 0.81	3.21	< 0.01
Teacher Support	3.49 ± 0.64	3.72 ± 0.61	-3.78	< 0.001
Peer Collaboration	3.92 ± 0.76	3.89 ± 0.73	0.45	0.68
Access to Resources	3.31 ± 0.81	3.28 ± 0.85	0.32	0.75

Results have shown that both STEM Self-Efficacy and Teacher Support indicate statistically significant gender differences. Male students have shown a significantly higher level of self-efficacy in science, technology, engineering, and math subjects, whereas females had perceived higher levels of teacher support. Such a hypothesis may imply that interventions in developing self-efficacy can provide benefits to females; on the other hand, increased mentoring and support could further help males have a better experience within STEM.

Regression Analysis: Predicting Problem-Solving Competence by Gender

We conducted a regression analysis to explain how each factor predicts the problem-solving competence of male and female students separately. The coefficients for each of the genders are presented in Table 3.

Table 3. Regression Coefficients For Each Gender Group

Gender	Factor	Standardized Beta (β)	Significance (p-value)
Male	STEM Interest	0.35	< 0.001
	STEM Self-Efficacy	0.33	< 0.001
	Teacher Support	0.21	< 0.05
Female	STEM Interest	0.39	< 0.001
	Teacher Support	0.27	< 0.01
	Peer Collaboration	0.20	< 0.05

While STEM Interest remained a strong predictor for both, STEM Self-Efficacy was more influential in male students, whereas Teacher Support and Peer Collaboration emerged as stronger predictors among females. These findings implicate the importance of gender-sensitive approaches in STEM education, where self-efficacy enhancement should be fostered, especially for females, and collaborative methods should be applied for males.

Qualitative Themes

The data obtained from focus group discussions gave more profound insights on the relevant issues. The major themes identified include:

Obstacles to Engagement in STEM Fields

"I think people always choose boys first for the projects in the area of STEM because they believe boys are better at it." (Female student)

"We do not have laboratories, nor even equipment to apply the things learned." (Male student)

Teacher Support and Its Implications

"Our teacher constantly supports us, even during those times we could not grasp something in class." (Female student)

"I better understand the topic with a detailed explanation from my teacher." (Male student)

Role of Peer Collaboration

"I like joining with my friends since it makes the process interesting and less terrifying with STEM." (Female student)

"Sometimes, my peers help me understand what the teacher could not." (Male student)

5. Discussion

It is a significant addition to the relatively underexplored territory of problem-solving ability in STEM subjects among upper secondary school students in Quang Tri Province, especially with reference to gender differences. This study has indicated that self-efficacy in problem-solving is shaped by many factors, such as parental encouragement, teacher support, curriculum engagement, and students' self-efficacy. The analysis indicates that STEM Interest and Self-Efficacy in STEM were the two most important predictors within a problem-solving competence domain, determining 47.4% of the variance. The findings align with Bandura's self-efficacy theory (1977), which emphasizes that confidence and individual capabilities determine performance. However, the study also highlights gender gaps in STEM education, identifying critical areas for targeted intervention.

In their roles among the strongest predictors of problem-solving competence, STEM Interest and STEM Self-Efficacy are consistent with earlier studies such as those by Blotnicky et al. (2018), who initiated similar relations between student engagement, confidence, and academic outcomes in the STEM context. Other contributing variables that highlighted dimensions of the partnership included Teachers' Support, Peer Collaboration, and Access to Resources, albeit a lesser extent.

Differences relating to gender were clear-cut in this study. Male respondents rated themselves higher than female ones on STEM Self-Efficacy ($t = 3.21$, $p < 0.01$), while the female respondents rated Teacher Support higher than their male counterparts ($t = -3.78$, $p < 0.001$). These findings replicate those of Wang and Degol (2017), who found that social and cultural factors had a lot to do with the gendered experience given about STEM education. Also, it emphasizes the necessity for spaces in learning environments that serve a variety of purposes, given the emphasis females placed on teacher support, as well as the fact that high self-efficacy in the males indicated the need to construct programs that would build confidence among females.

Focus group discussions have highlighted male and female students who expressed bias and barriers to participating in STEM, such as overlooking them to join projects like leadership roles, one of them saying, "First preference is always given to boys for STEM projects as if they are the best at it"; "We do not have enough labs or tools actually to apply what we have learned." The texts narrate how external factors and social dynamics shape both participation within STEM fields and problem-solving capacities.

Results from this study thusly bear importance for teachers and educational authorities alike in participatory disciplines within STEM education. First, there is the need for specific measures to assist in resource optimization and the engagement of females in STEM-related activities to equalize the tension and raise the morale of females in these areas. One example includes implementing and evaluating STEM programs geared toward minorities, providing them with hands-on resources and guidance from female scientists, which could significantly improve their perceptions (Estrada et al., 2016). Thus, teacher education should allow all children, irrespective of gender, to work actively in task solving rather than the contrasting and male faces (Ramsey, 2004).

Based on these results, they could formulate regional and national programs in terms of STEM education, such as gender discrimination reduction strategies, for instance, excluding schools from policies awarding STEM initiatives for boys or girls only. In addition, there is a need to conduct parent programs to help them know the importance of supporting their girls in pursuing STEM careers as per the family factor identified in this study.

This study has notable limitations that need to be pinned down. Firstly, the sample size, though relevant to Quang Tri Province, is restrictive in the generalizability of the findings in other parts of Vietnam and different socio-economic settings. Besides, since this study was cross-sectional, it only provides information on students' problem-solving competencies, parents' attitudes, and resources available at a particular moment. This method does not consider sustained changes or possible changes in gender relations within that period. Finally, although our mixed-methods approach made it possible to understand students' experiences better, the fact that we collected self-reported data is a limitation as it has problems; for instance, self-efficacy and parental influence responses may be flawed by the social desirability response bias.

To address these limitations, future research could build upon this study by investigating problem-solving ability and gender issues in STEM education in various provinces better to understand the regions regarding STEM education accessibility and support. Furthermore, longitudinal studies could be conducted to assess the evolution in student problem-solving skills and students' attitudes over time, mainly when national education policy changes occur. Future research may also include parents, teachers, and administrators to explain the factors that motivate or hinder students' participation in STEM, as evidenced in earlier literature (Thomas et al., 2020). Finally, interventions that target pedagogical approaches to teaching STEM, as well as the involvement of parents, are suggested to assist in reducing the gender disparity, thus forming a basis for new radical teaching methods in Vietnam.

6. Conclusion

This research explains a number of aspects regarding the problem-solving competence in STEM education for high school students in Quang Tri Province, particularly in terms of gender differences. The results suggest that, as in previous studies, aspects such as curriculum engagement, teacher support, parental encouragement, and student self-efficacy are important in developing problem-solving skills, especially in STEM where performance is concerned (McDonald, 2016). Among these, some aspects were found to be associated with the gender-based difference; most of the females appeared to have poor resource access and encouragement, which would be likely to affect their engagement and self-efficacy in STEM subjects. The gender resource tension is persistent and tends to be reinforced by the existing socio-cultural norms, effects of which are evident in the education sector as reported by UNESCO in the year 2020 and is therefore alleviation inform policies and practices.

In light of these observations, it becomes necessary for educational authorities and policymakers to pursue measures that seek to close the gender gaps in STEM education. Such activities should also include the formulation of gender-related policies that promote the fair distribution of STEM facilities to all students, coupled with training of teachers to create an enabling environment within the classrooms to ensure participation of both boys and girls. Male and female parents should also be educated on the need to help their female children take up the STEM subjects, perhaps through educating the community on the reason gender equity in education is important as such issues can be ingrained from an early age. These matters should be addressed through deliberate policy and community initiatives in order enhance problem-solving skills in STEM as well as ensure healthy and fair learning conditions for the succeeding generations (Sithole et al., 2017). A system that appreciates all learners regardless of their gender can help promote the culture of STEM study among the young girls relieving the society from the adverse effects of gender inequality.

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