An Investigation of Learning Engagement and Self-Interest Among Students in Learning Mathematics

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ABSTRACT

This study investigated the levels of learning engagement and self-interest in mathematics among male and female first-year Bachelor of Industrial Technology students. Results revealed that male students exhibited significantly higher learning engagement than female students, particularly in areas such as attentiveness during lessons, timely submission of assignments, effort to understand mathematical concepts, and feeling challenged in class. Female students demonstrated moderate engagement across these indicators, with slightly lower mean scores. Both genders showed comparable high engagement in seeking help when facing difficulties. Regarding self-interest, male students reported higher interest in mathematics, rating the subject as interesting and relevant to real-world contexts, whereas female students expressed moderate but positive attitudes. Both groups shared average motivation and enjoyment levels, with no significant gender difference in self-interest scores. Statistical analysis confirmed a significant difference in engagement ($p = 0.043$) but not in self-interest ($p = 0.070$) between males and females. These findings highlight a gender gap in behavioral and cognitive engagement in mathematics, while intrinsic interest remains similar. The study suggests the need for targeted pedagogical strategies to enhance female students' engagement, fostering inclusivity and improving learning outcomes in mathematics education.

Keywords: Learning Engagement and Self-interest.

INTRODUCTION

Learning engagement and self-interest of students in mathematics are crucial factors influencing their academic performance in school and their long-term disposition towards the subject [1]. In addition, the mathematics engagement involves behavioral, emotional, and cognitive dimensions, whereby it indicates students' active involvement in learning mathematical concepts, their emotional resonance towards the study of mathematics, and their intellectual engagement in learning mathematical ideas.

Efforts have continued for some time to promote gender equality in education; yet, there prevails stigma in the form of comparisons of differences in learning engagement and self-interest of male and female students in mathematics. This has offered the grounds for stereotypical beliefs and societal expectations that compromise how students themselves may view their confidence and abilities in the subject, laying a potential limitation on opportunities and inhibiting, especially female learners.

Both gender differences and male-stereotyped subjects strongly impact mathematics engagement and motivation [2]. Studies show male students generally display a more positive attitude toward mathematics, an increased level of motivation, and greater self-perceived competence. In contrast, female students tend to report feelings of low motivation and anxiety surrounding mathematics.

The United Nations Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education) and SDG 5 (Gender Equality), underscore the imperative of ensuring equal access to inclusive, equitable, and quality education for all individuals, regardless of gender [3]. Furthermore, SDG 4 aims to guarantee that by 2030, all girls and boys complete free, equitable, and quality primary and secondary education that leads to relevant and

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effective learning outcomes, while also promoting access to affordable technical, vocational, and tertiary education for both women and men.

Specific patterns seem to exist according to category variation in learning engagement and self-interest, and that is useful for developing focused instructional strategies to promote equitable participation and achievement in mathematics. Developing learning experiences that accommodate motivational and affective differences will help close gender gaps and keep both male and female students interested and successful in mathematics.

It is both essential and opportune to conduct an extensive study that addresses students' learning engagement and self-interest in mathematics. This study is especially important concerning Sustainable Development Goal 5 (Gender Equality), which aims to ensure inclusive and equitable learning opportunities for all students, irrespective of gender. By looking at mathematics education in applications within industrial technology programs, the study intends to unearth and address gender-based inequities and to create a more inclusive environment promoting the empowerment of both male and female students in industrial technology.

The research objectives highlight the urgency to eliminate barriers and create quality learning environments that support the full participation of male and female learners alike, acknowledging that education is a key engine of sustainable development, social equity, and technological empowerment. The study aims to evaluate the level of learning engagement and self-interest among students in mathematics and will study the two personalities from the perspective of the students' sex. In addition, it intends to establish whether the differences in learning engagement and self-interest are significant enough between males and females in providing insight into gender differences in motivation and participation in mathematics.

Framework of the Study

The study is anchored to the Self-Determination Theory of Deci and Ryan (1985) and Implicit Theories of Intelligence of Dweck and Legget (1988).

Self-Determination Theory emphasizes intrinsic motivation and psychological needs- autonomy, competence, and relatedness-that nurture students' engagement and interest in learning activities, including mathematics [4]. In addition, students are more likely to experience high levels of behavioral and emotional engagement and advanced cognitive engagement with the topic, along with enhanced self-interest in the subject, if the environment in which they learn appears to be supporting their needs.

More so, gender differences in motivation and engagement are affected by societal stereotypes that often label mathematics as a "male" domain, contributing to girls' lower math self-concept and interest [2]. In addition, these stereotypes can undermine girls' sense of competence and autonomy and further diminish their engagement. However, an encouraging environment for their psychological support, such as recognizing their autonomous needs through autonomy-supportive teaching and relatedness, can help narrow the gap in participation of girls and boys in learning.

Generally, the need for more autonomy support and need satisfaction is what explains, more than anything, variations in engagement in mathematics across male and female students. Increasing autonomy support and competence perception on the part of female students will therefore increase their engagement in mathematics, thus promoting gender equity in math learning.

While Dweck and Leggett's Implicit Theories of Intelligence framework (1988) has a profound effect on students' self-interest in the learning of mathematics in that it shapes their beliefs regarding whether mathematical performance is a fixed entity or, instead, genuinely malleable [5]. A student who possesses a growth the very belief that math abilities may be developed with experience and proper instruction, will exhibit greater intrinsic motivation and enjoyment of mathematics in the long run than their counterparts who possess a fixed mindset. This belief propels students to engage more meaningfully with the task, to persevere through difficulty, and to derive personal relevance from the learning of mathematics.

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Regarding gender, studies indicate that implicit theories can help explain differences in motivation and self-interest between male and female students [6]. Furthermore, promoting a growth mindset in female students can counteract these negative effects by enhancing their persistence and intrinsic motivation in math learning. Conversely, male students who hold incremental beliefs similarly show higher engagement and interest, but gender-specific social and educational factors influence how these beliefs translate into motivation.

Both theories collectively involved will be probing to find out how motivational beliefs and psychological needs intersect with engagement and individual interest in mathematics. One would also be interested in exploring how these variables might differ concerning sex. The theoretical framework will, thus, underpin the study's aim of finding essential differences and informing inclusive pedagogical initiatives that advance mathematics for all learners, as shown in Figure 1.

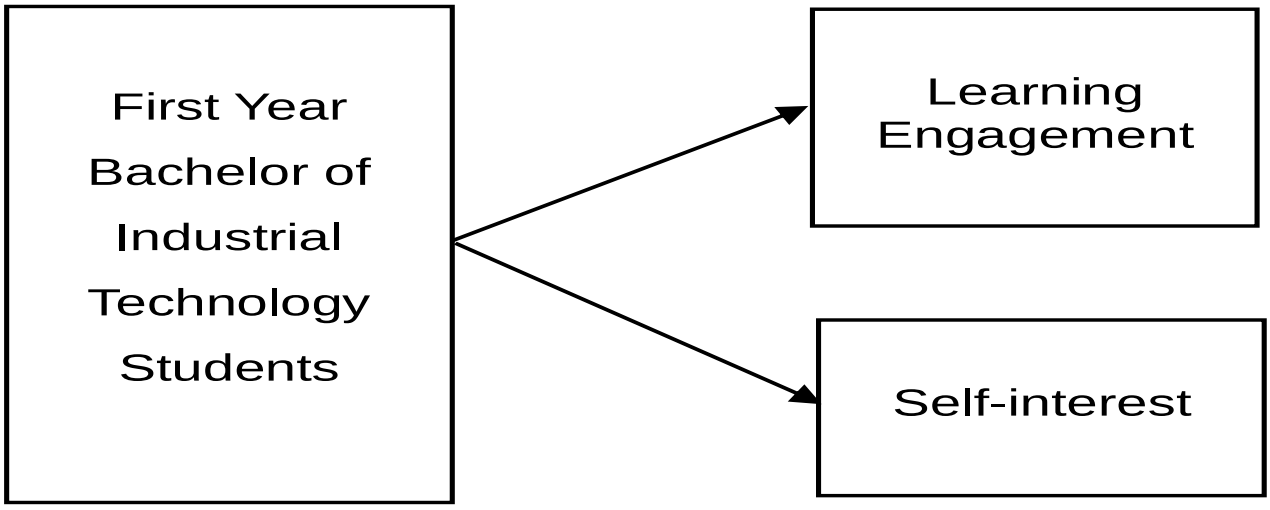

Fig. 1. Schematic diagram of Learning Engagement and Self-Interest Among Students in Learning Mathematics

Scope and limitations of the study

The study focuses on one hundred ninety-eight (n = 198) first-year Bachelor of Industrial Technology (BIndTech) students from a state university in Negros Occidental, all of whom are enrolled in Comprehensive Mathematics. It seeks to measure levels of students' learning engagement and self-interest in mathematics and how this influences their academic performance. Insights from these variables may prove useful in informing and improving mathematical education strategies for technology students.

The study was conducted at this particular institution because it is the sole provider of the Bachelor of Industrial Technology (BIT) program within Negros Occidental, Philippines. As a result, the scope of this research is confined exclusively to this institution and the BIT program. This focus is further justified by the fact that mathematics is regarded as an essential component of the BIT curriculum.

RESEARCH METHODOLOGY

Research Design

Employing a descriptive research design, the study systematically sought to appraise and describe students' learning engagement and self-interest in mathematics. The descriptive research design is a method of research that is systematically observant, describes, and documents the characteristics, behaviors, or phenomena of a specific population or situation without manipulation of any variables or establishment of cause and effect [7]. In addition, the descriptive research design suggests that this approach is most suitable when the research intends to answer on the structure of what, where, when, and how something takes place rather than provide answers for the question of why.

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Using descriptive research design, researchers can assess and describe these variables as they exist naturally in the student population. It allows for the description and measurement of levels of engagement and interest among students in learning mathematics. This allows the researcher to find patterns and differences in levels of involvement and interest, which may be across subgroups like gender.

Participants

A hundred eighty-four (n = 184) first-year Bachelor of Industrial Technology (BIndTech) students from a state university enrolled in Comprehensive Mathematics were included in the study. The participants were selected randomly from each program utilizing stratified random sampling, which guarantees representation of every subgroup in a population of 338 (N = 338), as shown in Table 1.

Table 1. Distribution of participants' sex per program

Program	**Male**	**%**	**Female**	**%**
Electrical Technology	13	76.47	4	23.53
Electronics Technology	12	70.59	5	29.41
Automotive Technology	31	88.57	4	11.43
Architectural Drafting Technology	16	47.06	18	52.94
Culinary Technology	9	28.13	23	71.88
HVACR Technology	12	70.59	5	29.41
Apparel and Fashion Technology	8	50.00	8	50.00
Mechanical Technology	14	87.50	2	12.50
Total	**115**	**62.50**	**69**	**37.50**

Instrument

A researcher-made instrument was designed and used to determine first-year BIndTech students' learning engagement and self-interest, self-concept, and self-motivation. The development of this instrument enabled targeted data gathering according to the study's objectives. Before implementation, the research instruments underwent thorough content validation. A panel of interdisciplinary experts validated the assessment tools using the Lawshe Method, achieving high content validity indices (0.99) for measuring student learning engagement and self-interest, confirming their suitability and validity.

To assess reliability, the researcher used internal consistency based on Cronbach's Alpha across constructs of learning engagement and self-interest in learning mathematics. A pilot test was run in the 2024-2025 academic year with MACOMA students who were later omitted from the final sample to avoid any possible bias in the study; the instruments showed a strong reliability with Cronbach's alpha of 0.88 for learning engagement and 0.75 for interest in learning mathematics, thus indicating a high level of internal consistency.

Data collection

The researchers secured the requisite permissions from key stakeholders. The Dean of the College of Arts and Sciences, where the researcher is a core mathematics teacher, granted the permission. Furthermore, permission was obtained from the Dean of the College of Industrial Technology, where the respondents were duly admitted. This holistic approach ensures that the institution's guidelines and codes of ethics are followed, thus ensuring the safeguarding of the interests of the researchers and their participants.

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Table 2. Students' learning engagement in learning mathematics

	Participants' engagement in learning mathematics	Male			Female		
		M	SD	Interpretation	M	SD	Interpretation
1	I pay attention in math class.	3.83	0.87	High	3.54	0.81	High
2	I actively participate in class discussions about math.	3.58	0.84	High	3.16	0.88	Average
3	I complete my math assignments on time.	3.63	0.91	High	3.30	0.94	Average
4	I put effort into understanding the math concepts taught in class.	3.63	0.84	High	3.49	0.72	Average
5	I ask questions in class when I don't understand something in math.	3.56	0.92	High	3.42	1.01	Average
6	I find math class interesting and stimulating.	3.39	0.80	Average	3.30	0.96	Average
7	I work hard on my math assignments even when they are difficult.	3.57	0.93	High	3.51	0.96	High
8	I feel motivated to learn more about math.	3.45	0.99	Average	3.12	0.92	Average
9	I spend extra time studying math outside of class.	2.99	0.96	Average	2.81	0.93	Average
10	I seek help from my teacher or classmates when I struggle with math problems.	3.62	0.89	High	3.59	1.06	High
11	I try to connect what I learn in math class to real-world situations.	3.63	0.92	High	3.29	0.89	Average
12	I feel challenged in math class.	3.98	0.85	High	3.94	0.94	High
13	I am proud of my accomplishments in math.	3.72	0.94	High	3.67	0.90	High
14	I get distracted easily during math class.	3.43	1.05	Average	3.46	0.93	Average
15	I feel like I am an active and important part of the math learning environment.	3.47	0.84	Average	3.07	0.90	Average

Data Analysis

The researcher analyzed the data descriptively and inferentially as appropriate to the goals. They conducted a normality test that informed the choice of inferential statistical tool. They found their data to be non-normally distributed by the Shapiro-Wilk test; non-parametric statistical techniques were employed. Their inferential statistical tests serve to analyze and, from those analyses, derive further interpretations of the data.

RESULTS

The levels of learning engagement in mathematics of male and female students are displayed in Table 2. Overall, the male students showed strong involvement in listening to math lessons (M = 3.83, SD = 0.87), submitting their work on time (M = 3.63, SD = 0.91), putting forth the required effort to understand mathematics (M = 3.63, SD = 0.84), and feeling challenged during the course (M = 3.98, SD = 0.85).

On the contrary, female students are found to have an average level of engagement in these aspects, which include listening (M = 3.54, SD = 0.81), submitting work on time (M = 3.30, SD = 0.94), making an effort to understand concepts (M = 3.49, SD = 0.72), and feeling challenged (M = 3.94, SD = 0.94).

In class discussions, male students reported rather higher participation (M = 3.58, SD = 0.84) compared to their female counterparts (M = 3.16, SD = 0.88), since both groups have equally high participation in seeking help when faced with difficulties in solving mathematics problems (Males: M = 3.62, SD = 0.89; Females: M = 3.59, SD = 1.06).

Active interest was reported by both males and females, with most showing an inclination towards spending extra time studying math outside class (Males: M = 2.99, SD = 0.96; Females: M = 2.81, SD = 0.93) and

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consistent average distractions during math class (Males: M = 3.43, SD = 1.05; Females: M = 3.46, SD = 0.93).

Table 3. Students' self-interest in learning mathematics

	Participants' self-interest in learning mathematics	Male			Female		
		M	SD	Interpretation	M	SD	Interpretation
1	I find mathematics to be an interesting subject.	3.51	0.96	High	3.39	0.97	Average
2	I look forward to math class.	3.46	0.94	Average	3.22	0.92	Average
3	I enjoy solving math problems.	3.31	0.99	Average	2.96	0.90	Average
4	I am curious to learn more about mathematics.	3.50	0.98	High	3.20	0.98	Average
5	I think mathematics is relevant to the real world.	3.87	0.99	High	3.74	1.04	High
6	I often think about math concepts outside of class.	3.19	0.93	Average	3.00	0.89	Average
7	I like to explore different ways to solve a math problem.	3.36	0.97	Average	3.07	0.99	Average
8	I am motivated to do well in mathematics.	3.41	0.94	Average	3.16	0.95	Average
9	I find satisfaction in understanding mathematical concepts.	3.43	0.93	Average	3.36	1.04	Average
10	I enjoy working on challenging math problems.	3.16	0.97	Average	3.00	0.94	Average
11	I would take more math courses if I had the opportunity.	2.91	1.06	Average	2.61	1.00	Average
12	I find mathematical patterns and relationships fascinating.	3.24	0.90	Average	3.06	1.00	Average
13	I see mathematics as a creative and imaginative subject.	3.42	0.91	Average	3.20	0.93	Average
14	I lose track of time when I am working on an interesting math problem.	3.24	0.97	Average	2.91	0.90	Average
15	I believe that learning mathematics is worthwhile, even if it's difficult sometimes.	3.61	0.91	High	3.55	1.02	High

Furthermore, the male students perceived themselves as active and important participants in the mathematics learning environment (M = 3.47, SD = 0.84) than females (M = 3.07, SD = 0.90).

These findings stand in contrast to previous studies. According to Fredricks and McColskey (2012), females normally have higher self-reports of behavioral engagement in math classrooms, especially concerning participation and effort [8]. Current findings here would suggest that, at least in this sample, male students self-report higher engagement on several major indicators. Perhaps cultural or contextual issues come into play as engagement patterns may be influenced by specific environmental variables such as a supportive teacher or a classroom's setting [9].

In addition, it was demonstrated that boys' engagement in mathematics could be more favorably influenced by perceived competence and autonomy support realized from their teachers. The present data may reflect these findings through participation and connection with real-world experiences.

To put it briefly, male students generally display more behavioral and cognitive engagement than female students in mathematics, and the latter group tends to show mild engagement across most indicators. Both groups, however, recognize challenges in math and actively seek support when needed, suggesting a shared awareness of the importance of help-seeking behaviors.

Results now point to the need for pedagogical strategies that enhance engagement and inclusiveness toward working toward active engagement and self-identity of female mathematics learners.

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Table 3 presents levels of students' self-interest in mathematics learning as male contrasted with female responses on different indicators.

Males showed considerable self-interest in most items, with some items reaching a high level of interest. For Male students, mathematics was considered an interesting subject (M = 3.51, SD = 0.96), and there was great interest in learning more about mathematics (M = 3.50, SD = 0.98). They also strongly believed that mathematics relates to the real world (M = 3.87, SD = 0.99). Somewhat poor compared with their male counterparts, female students mostly reported an average level of self-interest. Under interest, they rated mathematics as only moderately interesting (M = 3.39, SD = 0.97) and expressed average curiosity about learning more (M = 3.20, SD = 0.98) while also recognizing its relevance to the real world (M = 3.74, SD = 1.04).

The male and female students shared average levels of enjoyment and motivation concerning several things. For example, males reported a mean enjoyment of solving math problems (M = 3.31, SD = 0.99) in the mathematics case (M = 3.41, SD = 0.94) and with understanding concepts (M = 3.43, SD = 0.93). There were also slightly less average responses from females: solving problems (M = 2.96, SD = 0.90), motivational (M = 3.16, SD = 0.95), and satisfaction in understanding (M = 3.36, SD = 1.04). Interestingly, however, both groups showed average interest in trying out different methods of solving problems (Males: M=3.36, SD=0.97; Females: M=3.07, SD=0.99) and thought about math concepts outside class (Males: M=3.19, SD=0.93; Females: M=3.00, SD=0.89).

Interestingly, the average interest among male and female students in taking more math courses when asked to do so was approximately the same (Males: M = 2.91, SD = 1.06; Females: M = 2.61, SD = 1.00), indicating that these students would be rather enthusiastic toward further studies in mathematics. This was reflected by both groups, who, in terms of their average perception, regarded mathematics as a creative subject (Males: M = 3.42, SD = 0.91; Females: M = 3.20, SD = 0.93).

These findings complement Else-Quest et al. [2010], wherein males report greater interest and confidence in mathematics than females, affecting participation and achievement [10].

Present data continued this trend by depicting the extent of males' enthusiasm and curiosity on math topics beyond school activities, such as trying alternative ways of solving problems and thinking about mathematical concepts outside class time. However, both sexes are aware of mathematics's importance and real-world relevance, which further reveals how both sexes value the subject's worth, consistent with findings that motivation and perceived utility are principal for long-term engagement in STEM, regardless of gender [9].

Apart from this, despite the struggle, almost all items related to perseverance and the importance of mathematics recorded moderate to high scores for males and females. This shows they likely have a positive mindset on learning challenges, a condition critical for academic success [11]. The lower scores given by females in enjoyment and curiosity could highlight areas for which the efforts of educators may be directed toward building more interest and confidence, as evidenced by research indicating that targeted interventions could shrink gender gaps in math attitudes [12].

In summation, self-interest on the part of male students is slightly in favor of mathematics, especially concerning the subject matter's interesting and relevant qualities, whereas there seems to be a general tendency for female students to report positive attitudes, albeit at a moderate level. Both genders, on average, indicated moderate motivation and enjoyment in learning math; thus, some strategies could be implemented to further boost students' intrinsic interest and engagement in mathematics.

The comparison of students' learning engagement and self-interest in mathematics according to their sex is presented in Table 4.

The findings reveal that male students had a much higher mean score of learning engagement (M = 3.57) than females (M = 3.38). The difference is statistically significant with a Mann-Whitney U value of 3260.00 and a significant level of p = 0.043, which falls below the conventional p = 0.05 cut-off.

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Table 4. Comparison of students' learning engagement and self-interest in learning mathematics when grouped according to sex

Variables	Male	Female	U	p	Interpretation
Engagement	3.57	3.38	3260.00*	0.043	Significant
Self-interest	3.37	3.16	3334.00	0.070	Not significant

*Note: p < 0.05**

This result validates findings in related studies whereby the potential influence of gender differences on engagement may also come from factors like classroom environments, teacher expectations, or self-perception among students [13].

In contrast, their comparisons of self-interest scores among males (M = 3.37) and females (M = 3.16) yielded no significant difference, with a U of 3334.00 and a p-value of 0.070, which is above the 0.05 significance threshold.

This result is consistent with studies that find gender gaps in engagement and achievement but also highlight that intrinsic interest and motivation can vary widely among individuals and may be shaped by broader educational and cultural contexts [14]. Males may show greater engagement in certain classroom behaviors, and females often report comparable or even higher levels of interest and perseverance, mainly when supported by positive learning environments [9].

That is, males and females may differ in the extent of their engagement, but essentially, their self-interest in mathematics is approximately similar. Thus, these results strongly reveal that gender differences exist in self-engagement more than in intrinsic interest in mathematics, and therefore, possible interventions to increase the engagement of female students would be effective in improving their learning experiences.

CONCLUSION

Based on the results and findings, the following conclusions are presented:

Findings revealed further that concerning engagement in mathematics, male students exhibit higher levels of behavioral and cognitive engagement than female students, the latter showing moderate levels in most of the measures. Males are more engaged in participating in listening, submitting work, class discussions, and considering themselves part of the learning environment than females. Both groups fully agree that mathematics is complex and offers both sexes equal opportunities for help-seeking.

Aside from these differences, both genders acknowledge how hard Math is and see that the chances of seeking help are available. Such a pattern points to the need for building equitable learning environments, as stressed in Sustainable Development Goal 4 (SDG 4), which emphasizes inclusive and quality education for all, and SDG 5, which emphasizes gender equality and the empowerment of women and girls [15].

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Male students have more self-interest in mathematics than female learners in that they typically rate the subject as more interesting and show greater curiosity in learning more. Both males and females agree that mathematics has real-world relevance, although males tend to express slightly stronger agreement. Both males and females rate moderately in enjoyment and motivation concerning solving problems and understanding concepts, though males tend to have a somewhat higher self-report than females.

SDG 5 specifically targets eliminating gender-based inequalities and empowering women and girls in all areas, including education. Male and female students alike consider mathematics relevant to the real world. However, the slight edge in agreement by males and their self-reports of enjoyment of and motivation in mathematics reveals the stereotypes engrained into the minds of students concerning sex-based attitudes and self-perception.

Males and females alike reveal, on average, an interest in varying problem-solving methods and thinking about mathematics concepts outside the classroom. Therefore, male students have a stronger intrinsic motivation towards mathematics, although there is a moderate engagement and motivation shared by both genders, which demonstrates a possibility for the further development of interest and enjoyment in mathematics for female students.

This pattern indicates a broad scope for enhancing and deepening interest in and enjoyment of mathematics among female learners. To pursue Sustainable Development Goal 4 (SDG 4), which pertains to inclusive and equitable quality education, fostering intrinsic motivation and active engagement will ensure all learners can develop requisite skills for lifelong learning and employability [15]. Furthermore, Sustainable Development Goal 5 (SDG 5) spoke about gender equality and empowerment of women and girls against gender disparities in STEM education [16].

The comparison reveals the following concerning learning engagement and self-interest in mathematics in terms of male and female students: relative to the male counterparts of the students, the female students displayed lower engagement in mathematics learning, as proven by the difference in mean engagement scores being statistically significant. However, concerning self-interest in mathematics, both groups are similar, as statistically, there is no difference between male and female students, implying that interest levels in the subject do not differ across genders.

This statistically significant difference in engagement demonstrates that there are still challenges regarding equitable educational experiences, which is central to Sustainable Development Goal 4 (SDG 4), ensuring inclusive and equitable education for all learners [15]. Interestingly, while there is a difference in engagement between male and female students, both genders have self-interest in mathematics at almost equal levels, with no significant difference. This could suggest that although they may share a similar intrinsic interest in mathematics, many external factors, such as classroom environment, teaching practices, and social expectations, influence the degree of active participation, particularly for females. It speaks well to Sustainable Development Goal 5 (SDG 5), promoting gender equality and the empowerment of women and girls, as such disparities create inequities that have to be addressed within an informed, supportive, gender-responsive learning environment, as enablers to encourage female student participation and engagement in STEM subjects [16].

RECOMMENDATION

Based on the analysis of the results and findings, the following recommendations are presented:

Through offering training workshops for math faculty in gender-sensitive teaching strategies and techniques to increase engagement for female students as well as confidence in mathematics, the administration should create initiatives that specifically boost interest and curiosity in mathematics for female students in particular, because of the reported gap in self-interest compared to male students.

Implementing flexible learning modules that use diverse instructional strategies for students' progression at their own pace is necessary for equitable and inclusive mathematics learning within Sustainable Development Goal 4 (Quality Education) and Sustainable Development Goal 5 (Gender Equality). Additional support for

female learners should guide them to participate deeply in complex mathematical concepts and overcome participation challenges. Curriculum design should cater to articulating the real-life practicalities and creative aspects of mathematics as a subject to all students, regardless of gender. Such identification of practicality and creativity in these modules can heighten intrinsic agency and interest among both male and female learners. This not only appeals to the attainment of the SDG 4 indicator for inclusive and equitable quality education but also pushes SDG 5 progress further by empowering female students and reducing the gender gap in the field of Industrial Technology.

Mathematics faculty should create an atmosphere to support students in asking questions and seeking assistance, reinforcing help-seeking as a strength and not a weakness, maintaining sensitivity toward the slight differences in self-interest between male and female students, and encouraging female students to engage, show curiosity, and further their math studies.

Future researchers would be encouraged to study the complex relationship between gender and mathematics learning, looking not only at achievement but also attitudes, motivation, and engagement from the perspective of diverse educational contexts. Also, how factors like parents' monthly income of students may affect these variables would give an even fuller picture of the barriers and opportunities that create students' experiences in mathematics.

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