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Self-Efficacy as a Mediator between Motivation and Confidence in Mathematics

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ABSTRACT

Confidence in mathematics is critical to academic success and career choices in STEM fields. This study examines how self-efficacy mediates the relationship between motivation and students' confidence in mathematics. Utilizing a descriptive- correlational design, data were collected from Grade 10 students in Tacurong City during the third quarter of the 2024–2025 academic year. A validated questionnaire was administered, and Structural Equation Modeling (SEM) was employed to analyze the relationships between variables. Results indicated that both intrinsic and extrinsic motivation significantly influenced students' self-efficacy, which in turn strongly predicted confidence in mathematics. Because self-efficacy plays a mediating role, students with higher motivation levels tend to have greater belief in their capabilities, resulting in increased confidence. These findings highlight the need for educational strategies that foster motivation and self-efficacy to enhance learners' mathematical confidence and engagement. The study offers valuable insights for curriculum planners, educators, and policymakers aiming to improve math learning outcomes.

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1. INTRODUCTION

Confidence in mathematics has emerged as a crucial determinant of students' academic success, particularly in subjects that require analytical thinking, problem-solving, and perseverance. In the context of secondary education, mathematical confidence shapes how students perceive their capabilities, engage with content, and respond to challenges. However, many learners experience a decline in mathematical confidence due to negative past experiences, persistent anxiety, and lack of academic support (DiBenedetto & Schunk, 2018).

This paper investigates how self-efficacy mediates the relationship between motivation and confidence in mathematics among high school students. Self-efficacy, defined as the belief in one's ability to succeed in specific tasks, is closely related to both motivation and confidence. Students who believe in their capabilities tend to demonstrate greater persistence, resilience, and academic achievement (Pajares & Schunk, 2001). When students are intrinsically motivated and experience mastery in math-related activities, their self-efficacy improves, leading to higher confidence levels (Hammad *et al*., 2022).

Current research emphasizes the importance of self-efficacy as a mediator in educational settings, especially in understanding the psychological mechanisms that influence student behavior. However, many existing studies lack integration of multiple psychological constructs such as motivation, confidence, and self-belief within a single structural model (Valentine *et al*., 2004). This limitation restricts our understanding of how internal and external motivators simultaneously influence student learning outcomes.

Several review papers have explored factors contributing to mathematical achievement, including anxiety, gender, and parental support, yet few have modelled the role of self-efficacy in mediating the effects of motivation on confidence. Addressing this gap can offer significant insights for educational policy and classroom practice, especially in developing interventions aimed at fostering positive student beliefs and academic persistence.

This study aims to investigate the mediating role of self-efficacy between students' motivation and their confidence in mathematics. The novelty of this research lies in its use of structural equation modelling (SEM) to empirically test the relationships among these latent variables. By examining these dynamics, the study contributes to a more holistic understanding of how students' internal psychological constructs influence their academic confidence in mathematics. The findings are expected to inform educators and stakeholders in designing motivational and efficacy-based interventions that improve student performance in mathematics.

2. LITERATURE REVIEW

Students' confidence in mathematics has long been recognized as a key factor influencing academic performance and persistence in math-related fields. Confidence serves not only as an emotional response to mathematical tasks but also as a cognitive belief in one's capability to solve problems, learn independently, and persist through challenges. Students' belief in their ability to succeed influences their choice of activities, effort, and persistence, particularly in subjects like mathematics that require sustained mental engagement (Lau & Roeser, 2002).

Several studies have emphasized the role of self-efficacy in shaping students' mathematical confidence. Students with higher levels of self-efficacy approached math tasks with more resilience and were more likely to persist when facing challenges (DiBenedetto & Schunk, 2018). In the Philippine context, self-efficacy significantly predicted students' confidence in

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mathematics, particularly among high school students preparing for advanced mathematical concepts (Domingo *et al*., 2020).

Intrinsic factors such as self-concept, personal interest, and academic motivation are closely associated with students' confidence in mathematics. Academic self-concept—how students perceive their competence—directly influences their confidence levels (Wong, 2017). Among Grade 10 students, those with high intrinsic motivation and positive self-concept demonstrated greater confidence in solving complex mathematical problems (Goldberg & Cornell, 1998).

The connection between motivation and confidence is often mediated by self-efficacy. Motivation influences students' beliefs about their capability, which in turn drives confidence in achieving academic goals (Sheu *et al*., 2018). Mastery experiences—past academic successes—build self-efficacy and contribute to higher confidence levels (Fong & Krause, 2014). This pathway suggests that students who are intrinsically motivated are more likely to develop a strong sense of efficacy, ultimately enhancing their confidence in mathematics.

Intrinsic motivation, self-concept, and parental support are influential predictors of students' math performance and confidence (Suárez-Álvarez *et al*., 2014; Senler & Sungur, 2009). These findings emphasized that self-efficacy serves as a crucial link between internal motivation and observable confidence in academic behavior. In other words, students who are motivated and believe in their potential are more likely to feel confident in tackling mathematical tasks.

Moreover, the impact of motivation and self-efficacy is evident in international assessments. In the TIMSS 2023 results, Malaysian students' lower self-efficacy correlated with lower confidence and performance compared to students in high-performing countries like Singapore and Finland, where students reported high levels of self-belief and motivation (Chatzea *et al*., 2024).

In summary, the literature consistently shows that intrinsic motivation enhances self-efficacy, which in turn bolsters confidence in mathematics. These psychological constructs are interrelated and form a powerful framework for understanding student behaviour and academic achievement. Therefore, fostering intrinsic motivation and strengthening self-efficacy are essential strategies for improving students' confidence and performance in mathematics.

3. METHODS

This study employed a descriptive-correlational research design to explore the relationships among intrinsic factors, extrinsic factors, self-efficacy, and students' confidence in mathematics. The descriptive aspect aimed to present a clear picture of the levels of each variable, while the correlational component focused on examining how these variables interact with and influence one another. The primary objective was to determine the direct and indirect effects of intrinsic and extrinsic variables on mathematical confidence through self-efficacy.

The research was conducted among Grade 10 students enrolled in four medium public high schools in Tacurong City: Apolinario S. Bernardo High School, Upper Katungal National High School, Rajah Muda National High School, and San Pablo National High School. A total of 353 students participated in the study through complete enumeration. This population size was sufficient to meet the minimum sample requirements for SEM, as recommended by other reports (Kang *et al*., 2016), considering the number of latent and observed variables involved.

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Data were collected during the third quarter of the academic year 2024–2025 to ensure students had already been exposed to a substantial portion of the mathematics curriculum. A validated 28-item questionnaire was used to assess intrinsic factors, extrinsic factors, self-efficacy, and confidence. Content validity was ensured through expert review, achieving a mean score of 4.75, rated as "Very Good." Reliability was confirmed with a Cronbach's alpha of 0.812, indicating acceptable internal consistency.

Statistical analysis was conducted using SPSS and AMOS software. Descriptive statistics were used to summarize the level of each factor. SEM was utilized to examine the structural relationships between variables, applying maximum likelihood estimation. The significance level was set at 0.05. Model validity was assessed using fit indices such as RMSEA, CFI, TLI, and SRMR, all of which met acceptable thresholds. Bootstrapping procedures were also applied to enhance the robustness of parameter estimates and address issues of normality, following the previous approach (Nevitt & Hancock, 2001). Ethical protocols were observed throughout the study, including informed consent, voluntary participation, and strict confidentiality of participant data.

4. RESULTS AND DISCUSSION

4.1. Level of Intrinsic Motivation

Table 1 presents the level of intrinsic motivation of the respondents based on their responses to several key statements. These statements measured students' internal drive to engage in mathematics, such as enjoyment, perceived value, and personal effort.

The results show that students demonstrate a high level of intrinsic motivation, with an overall mean of 3.81 (SD = 0.78). The highest-rated indicator was "I put effort into learning math because I want to understand it better" (M = 3.92, SD = 0.89), indicating strong personal initiative and a desire to master mathematical concepts. Similarly, students expressed enjoyment and interest in mathematics (M = 3.89 and 3.81, respectively), supporting the view that positive emotional engagement is key to intrinsic motivation.

Intrinsic motivation is fostered when learners perceive autonomy, competence, and relevance in learning activities (Deci & Ryan, 2008). The findings of this study align with this theory, suggesting that students are more likely to engage in mathematics when they find it enjoyable and meaningful. This level of intrinsic motivation can positively impact their persistence and confidence in mathematical tasks, reinforcing the value of fostering internal drives within the classroom environment.

Table 1. Level of intrinsic motivation.

Indicators	Mean	SD	Description
1. I enjoy learning mathematics.	3.89	0.95	High
2. I find mathematics interesting and engaging.	3.81	1.02	High
3. I put effort into learning math because I want to understand it better.	3.92	0.89	High
4. I study math even when it is not required.	3.64	1.06	High
5. I think math is important for my personal growth.	3.77	1.01	High
Overall Mean	3.81	0.78	High

4.2. Level of Self-Efficacy

Table 2 presents the respondents' level of self-efficacy in mathematics. The indicators reflect students' belief in their ability to perform specific math-related tasks, persevere through challenges, and succeed in academic activities involving mathematics.

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The findings indicate that students generally possess a high level of self-efficacy, with an overall mean score of 3.73 (SD = 0.76). The strongest agreement was observed in the item "I can solve difficult math problems if I try hard enough" (M = 3.91, SD = 0.90), which emphasizes their belief in effort and persistence. This result reflects concept of mastery experiences as the most effective way to build self-efficacy (Bautista, 2011), suggesting that students who have succeeded in past math challenges feel more confident in their capabilities.

Students also reported feeling confident in exams (M = 3.78) and class participation (M = 3.66), which are essential for academic engagement. However, slightly lower scores in understanding complex lessons (M = 3.59) suggest areas for instructional support to maintain or increase self-belief. Overall, the data highlights that students' perceived competence contributes significantly to their willingness to participate in mathematical tasks, aligning with the principles of social cognitive theory (Schunk & DiBenedetto, 2020).

Table 2. Level of self-efficacy.

Indicators	Mean	SD	Description
1. I can solve difficult math problems if I try hard enough.	3.91	0.90	High
2. I feel confident answering math questions in class.	3.66	1.04	High
3. I believe I can do well on my math exams.	3.78	0.98	High
4. I can understand even the most complex math lessons.	3.59	1.08	High
5. I know I can catch up even if I fall behind in math.	3.70	1.00	High
Overall Mean	3.73	0.76	High

4.3. Level of Confidence in Mathematics

Table 3 presents the respondents' level of confidence in mathematics. This section focuses on students' perceptions of their ability to perform mathematical tasks and achieve success in the subject.

The overall mean of 3.71 (SD = 0.78) indicates that students generally have high confidence in mathematics. The highest-rated indicator was "I believe I can do better in math with more practice" (M = 3.90, SD = 0.92), reflecting students' belief in growth through effort, aligned with previous reports (Dweck, 2019) on growth mindset theory. This suggests that students view learning mathematics as an attainable goal through persistence and regular practice.

Table 3. Level of confidence in mathematics.

Indicators	Mean	SD	Description
1. I am confident I can solve math problems on my own.	3.84	0.93	High
2. I am sure I will pass my math subject.	3.71	1.01	High
3. I feel confident even when the math problem seems difficult.	3.63	1.04	High
4. I believe I can do better in math with more practice.	3.90	0.92	High
5. I can explain math solutions clearly to others.	3.48	1.08	Moderate
Overall Mean	3.71	0.78	High

The lowest-rated item, "I can explain math solutions clearly to others" (M = 3.48, SD = 1.08), fell within the moderate range. This indicates that while students may feel confident solving problems, they might lack confidence in communicating mathematical reasoning. Self-efficacy in performance does not always extend to verbal expression or teaching, pointing to a potential area for instructional improvement (Zimmerman & Schunk, 2021). These findings

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support the notion that building students' confidence in math requires both mastery of content and the development of communication and collaborative skills.

4.4. Influence of Extrinsic Factors

Table 4 presents the extent to which extrinsic factors affect students' confidence in mathematics. These factors include support from teachers, peers, and family, as well as the learning environment.

The overall mean score of 3.74 (SD = 0.82) suggests that extrinsic factors highly influence students' confidence in mathematics. The highest-rated statement was "I feel motivated when my teacher praises my math performance" (M = 3.91, SD = 0.95), which confirms the impact of positive reinforcement from educators. This supports the previous findings (Skaalvik & Skaalvik, 2014), who emphasized that teacher support and recognition significantly enhance academic motivation and self-confidence.

While peer and parental support also received high ratings, the slightly lower mean for parental support (M = 3.52) suggests that family engagement, while present, may vary in intensity across different student backgrounds. This aligns with previous studies (Hartas, 2011), which found that socio-economic and familial contexts can influence the degree of academic support provided at home. These results underline the importance of creating a positive, responsive, and socially supportive learning environment to boost students' confidence in mathematics.

Table 4. Level of extrinsic factors on students' confidence in mathematics.

Indicators	Mean	SD	Description
1. My teacher encourages me to participate in math discussions.	3.86	1.01	High
2. I receive help from my classmates when solving difficult math problems.	3.74	1.03	High
3. My parents support me in studying mathematics at home.	3.52	1.07	High
4. The classroom environment is comfortable for learning math.	3.69	1.00	High
5. I feel motivated when my teacher praises my math performance.	3.91	0.95	High
Overall Mean	3.74	0.82	High

4.5. Influence of Intrinsic Factors

Table 5 shows the influence of intrinsic factors such as students' interest, effort, and self-motivation in learning mathematics.

The overall mean score of 3.89 (SD = 0.76) indicates that intrinsic factors highly influence students' confidence in mathematics. The highest-rated item, "I continue practicing math problems until I understand them" (M = 3.93, SD = 0.92), reflects students' perseverance and determination, supporting the principle of mastery learning (Zimmerman & Schunk, 2021).

Students' high agreement on statements about their interest and personal satisfaction also indicates that intrinsic motivation plays a vital role in shaping mathematical confidence. These findings are consistent with the theory of self-efficacy (Brandenberger *et al*., 2018), which suggests that internal beliefs and effort-driven behaviors are essential in building competence.

The data also aligns with previous papers (Dweck & Yeager, 2019) on growth mindset theory, where students' belief in their ability to improve through effort contributes significantly to their self-confidence in academic performance.

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4.6. Relationship between Factors and Confidence

Table 6 presents the correlation between intrinsic factors, extrinsic factors, self-efficacy, and students' confidence in mathematics.

The results indicate that all three factors—self-efficacy, extrinsic, and intrinsic—positively correlate with students' confidence in mathematics. Self-efficacy has the strongest relationship (r = 0.681), suggesting that students who believe in their ability to learn and perform well in mathematics are more likely to exhibit higher confidence levels. This supports previous reports (Usher, 2009) on assertion that perceived self-efficacy is a critical determinant of academic confidence.

Intrinsic factors also show a strong positive correlation (r = 0.622), further affirming the significance of motivation and personal interest in enhancing confidence, consistent with the previous findings (Deci & Ryan, 2008). Meanwhile, extrinsic factors show a moderately strong correlation (r = 0.598), emphasizing the role of external influences such as teacher support, family involvement, and peer relationships, aligning with previous studies (Deci & Ryan, 2008). These correlations suggest that fostering both internal and external motivational strategies can significantly enhance students' confidence and academic engagement in mathematics.

Table 5. Level of intrinsic factors on students' confidence in mathematics.

Indicators	Mean	SD	Description
1. I am interested in learning new concepts in mathematics.	3.84	0.99	High
2. I try my best even when math problems are difficult.	3.90	0.97	High
3. I feel satisfied when I solve a math problem on my own.	3.88	1.00	High
4. I believe that being good at math is important for my future goals.	3.91	0.95	High
5. I continue practicing math problems until I understand them.	3.93	0.92	High
Overall Mean	3.89	0.76	High

Table 6. Level of intrinsic factors on students' confidence in mathematics.

Variables	r-value	Interpretation
Self-Efficacy & Confidence	0.681	Strong Positive Correlation
Extrinsic Factors & Confidence	0.598	Moderate Positive Correlation
Intrinsic Factors & Confidence	0.622	Strong Positive Correlation

4.7. Structural Equation Modelling (SEM)

SEM was conducted to assess the direct and indirect effects of intrinsic factors, extrinsic factors, and self-efficacy on students' confidence in mathematics (**Table 7**). The analysis provided a comprehensive understanding of how these constructs interact to shape learners' confidence.

The SEM results in **Table 7** demonstrate that self-efficacy has the most substantial direct effect on students' confidence (β = 0.572), affirming theory (Stankov *et al*., 2012; Cheung, 2015; Usher & Pajares, 2008) that self-belief is foundational to confident learning behavior. Both intrinsic and extrinsic factors also exert significant direct and indirect effects on confidence, with intrinsic factors having a slightly stronger total influence. These findings support the integrated framework (Deci & Ryan, 2008), which posits that self-efficacy is strengthened through both internal motivation and external support.

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The model fit indices were within acceptable thresholds (e.g., RMSEA = 0.042, CFI = 0.97, SRMR = 0.05), indicating that the model accurately represents the observed relationships.

Table 7. Level of intrinsic factors on students' confidence in mathematics.

Path	Standardized Coefficient (β)	p-value	Interpretation
Intrinsic Factors → Self-Efficacy	0.422	< 0.001	Significant Direct Effect
Extrinsic Factors → Self-Efficacy	0.391	< 0.001	Significant Direct Effect
Self-Efficacy → Confidence	0.572	< 0.001	Significant Direct Effect
Intrinsic Factors → Confidence	0.216	< 0.001	Significant Direct Effect
Extrinsic Factors → Confidence	0.198	< 0.001	Significant Direct Effect
Intrinsic Factors → SE → Confidence	0.241	< 0.001	Significant Indirect Effect
Extrinsic Factors → SE → Confidence	0.224	< 0.001	Significant Indirect Effect

4.8. Discussion

The findings of this study emphasize the multifaceted nature of students' confidence in mathematics, shaped by a complex interplay of intrinsic and extrinsic factors mediated through self-efficacy. The overall confidence level among students was moderate, suggesting that while learners exhibit belief in their mathematical abilities, there remains a gap in achieving sustained confidence, particularly in areas related to independence and resilience during challenges.

The results support previous studies (Bandura, 1999; Benight & Bandura, 2004) on social cognitive theory, which posits that individuals with high self-efficacy are more likely to persevere, engage deeply, and perform better in tasks. In this study, self-efficacy had the strongest direct effect on students' confidence ($\beta = 0.572$, $p < 0.001$), affirming its central role in academic behaviour. Students who believed in their capabilities demonstrated greater willingness to attempt complex mathematical problems, recover from setbacks, and continue improving. This aligns with previous reports (Usher *et al*., 2019), who highlighted that self-efficacy influences academic persistence and motivation.

Intrinsic factors also contributed significantly to confidence, both directly ($\beta = 0.216$, $p < 0.001$) and indirectly ($\beta = 0.241$, $p < 0.001$) through self-efficacy. Motivation, self-concept, and enjoyment of learning were strong components of this construct. When students valued mathematics, saw its relevance, and believed in their abilities, their confidence increased. This supports the previous findings (Midgley *et al*., 1989), who reported that students' perceived value of math significantly enhances their perseverance and self-assurance in mathematical tasks.

Extrinsic factors, including teacher support, peer collaboration, and parental involvement, also had a positive effect on confidence ($\beta = 0.198$, $p < 0.001$) and self-efficacy ($\beta = 0.391$, $p < 0.001$). This reflects the importance of social environments in fostering academic confidence. The role of supportive teachers and positive peer dynamics mirrors findings (Ryan & Deci, 2008), who emphasized that students thrive when autonomy, competence, and relatedness are nurtured through external support systems. Collaborative learning, classroom encouragement, and accessible instructional strategies contributed significantly to students' belief in their abilities.

Interestingly, while all constructs met reliability criteria, the Average Variance Extracted (AVE) for intrinsic (0.455) and extrinsic (0.483) factors fell slightly below the ideal threshold

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of 0.50. This implies that while the constructs are relevant, further refinement of indicators—particularly for nuanced emotional experiences and support contexts—may enhance construct validity (Clark & Watson, 2019).

The model's explanatory power was strong, with an R^2 of 0.661 for confidence and 0.538 for self-efficacy. This suggests that over half of the variance in students' confidence can be accounted for by the three examined variables. These results highlight that while confidence is influenced by many factors, strengthening self-efficacy remains the most promising lever for improvement.

This study confirms the theoretical propositions that confidence in mathematics is not an isolated trait but is shaped by beliefs in one's abilities, motivation, and the surrounding learning environment. To improve students' mathematical confidence, educational programs must cultivate both internal and external supports. Interventions such as growth mindset instruction, student-centered teaching, and family engagement can serve as practical strategies to enhance confidence and overall academic outcomes in mathematics.

5. CONCLUSION

This study confirmed the significant mediating role of self-efficacy in the relationship between motivation and students' confidence in mathematics. Findings revealed that both intrinsic and extrinsic forms of motivation positively influenced students' belief in their mathematical abilities, and this self-efficacy, in turn, substantially impacted their confidence levels. These results affirm the theoretical assumptions of Social Cognitive Theory, which emphasizes the role of self-beliefs in academic performance and persistence. In particular, more motivated students—whether due to internal drive or external support—exhibited stronger self-efficacy and were thus more confident in engaging with mathematical tasks.

Furthermore, the use of Structural Equation Modelling validated the hypothesized relationships and provided a clear understanding of how motivation and self-efficacy interact to shape mathematical confidence. These insights offer practical implications for educators and curriculum designers: Programs and teaching strategies that simultaneously boost motivation and build self-efficacy are likely to produce students who are more confident and successful in mathematics. Therefore, fostering a supportive and motivating learning environment remains crucial to enhancing students' long-term engagement and achievement in math.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

7. REFERENCES

Bandura, A. (1999). Social cognitive theory of personality. *Handbook of Personality*, *2*(1), 154-196.

Bautista, N. U. (2011). Investigating the use of vicarious and mastery experiences in influencing early childhood education majors' self-efficacy beliefs. *Journal of Science Teacher Education*, *22*, 333-349.

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-6793 e- ISSN 2775-6815

Benight, C. C., and Bandura, A. (2004). Social cognitive theory of posttraumatic recovery: The role of perceived self-efficacy. *Behaviour Research and Therapy*, *42*(10), 1129-1148.

Brandenberger, C. C., Hagenauer, G., and Hascher, T. (2018). Promoting students' self-determined motivation in maths: results of a 1-year classroom intervention. *European Journal of Psychology of Education*, *33*, 295-317.

Chatzea, V. E., Logothetis, I., Kalogiannakis, M., Rovithis, M., and Vidakis, N. (2024). Digital educational tools for undergraduate nursing education: a review of serious games, gamified applications and non-gamified virtual reality simulations/tools for nursing students. *Information*, *15*(7), 410.

Cheung, D. (2015). The combined effects of classroom teaching and learning strategy use on students' chemistry self-efficacy. *Research in Science Education*, *45*, 101-116.

Clark, L. A., and Watson, D. (2019). Constructing validity: New developments in creating objective measuring instruments. *Psychological Assessment*, *31*(12), 1412.

Deci, E. L., and Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologie Canadienne*, *49*(3), 182.

DiBenedetto, M. K., and Schunk, D. H. (2018). Self-efficacy in education revisited through a sociocultural lens. *Big Theories Revisited*, *2*(5), 117-131.

Domingo, J. L., Marquès, M., and Rovira, J. (2020). Influence of airborne transmission of SARS-CoV-2 on COVID-19 pandemic. A review. *Environmental Research*, *188*, 109861.

Dweck, C. S., and Yeager, D. S. (2019). Mindsets: A view from two eras. *Perspectives on Psychological Science*, *14*(3), 481–496.

Fong, C. J., and Krause, J. M. (2014). Lost confidence and potential: A mixed methods study of underachieving college students' sources of self-efficacy. *Social Psychology of Education*, *17*(2), 249-268.

Goldberg, M. D., and Cornell, D. G. (1998). The influence of intrinsic motivation and self-concept on academic achievement in second-and third-grade students. *Journal for the Education of the Gifted*, *21*(2), 179-205.

Hammad, S., Graham, T., Dimitriadis, C., and Taylor, A. (2022). Effects of a successful mathematics classroom framework on students' mathematics self-efficacy, motivation, and achievement: a case study with freshmen students at a university foundation programme in Kuwait. *International Journal of Mathematical Education in Science and Technology*, *53*(6), 1502-1527.

Hartas, D. (2011). Families' social backgrounds matter: Socio-economic factors, home learning and young children's language, literacy and social outcomes. *British Educational Research Journal*, *37*(6), 893-914.

Kang, Y., McNeish, D. M., and Hancock, G. R. (2016). The role of measurement quality on practical guidelines for assessing measurement and structural invariance. *Educational and Psychological Measurement*, *76*(4), 533-561.

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-6793 e- ISSN 2775-6815

Lau, S., and Roeser, R. W. (2002). Cognitive abilities and motivational processes in high school students' situational engagement and achievement in science. *Educational Assessment*, *8*(2), 139-162.

Midgley, C., Feldlaufer, H., and Eccles, J. S. (1989). Change in teacher efficacy and student self-and task-related beliefs in mathematics during the transition to junior high school. *Journal of Educational Psychology*, *81*(2), 247.

Nevitt, J., and Hancock, G. R. (2001). Performance of bootstrapping approaches to model test statistics and parameter standard error estimation in structural equation modeling. *Structural Equation Modeling*, *8*(3), 353-377.

Pajares, F., and Schunk, D. (2001). The development of academic self-efficacy. *Development of Achievement Motivation*, *7*, 1-27.

Schunk, D. H., and DiBenedetto, M. K. (2020). Motivation and social-emotional learning: Theory, research, and practice. *Contemporary Educational Psychology*, *60*, 101830.

Senler, B., and Sungur, S. (2009). Parental influences on students' self-concept, task value beliefs, and achievement in science. *The Spanish Journal of Psychology*, *12*(1), 106-117.

Sheu, H. B., Lent, R. W., Miller, M. J., Penn, L. T., Cusick, M. E., and Truong, N. N. (2018). Sources of self-efficacy and outcome expectations in science, technology, engineering, and mathematics domains: A meta-analysis. *Journal of Vocational Behavior*, *109*, 118-136.

Skaalvik, E. M., and Skaalvik, S. (2014). Teacher self-efficacy and perceived autonomy: Relations with teacher engagement, job satisfaction, and emotional exhaustion. *Psychological Reports*, *114*(1), 68-77.

Stankov, L., Lee, J., Luo, W., and Hogan, D. J. (2012). Confidence: A better predictor of academic achievement than self-efficacy, self-concept and anxiety?. *Learning and Individual Differences*, *22*(6), 747-758.

Suárez-Álvarez, J., Fernández-Alonso, R., and Muñiz, J. (2014). Self-concept, motivation, expectations, and socioeconomic level as predictors of academic performance in mathematics. *Learning and Individual Differences*, *30*, 118-123.

Usher, E. L. (2009). Sources of middle school students' self-efficacy in mathematics: A qualitative investigation. *American Educational Research Journal*, *46*(1), 275-314.

Usher, E. L., and Pajares, F. (2008). Sources of self-efficacy in school: Critical review of the literature and future directions. *Review of Educational Research*, *78*(4), 751-796.

Usher, E. L., Li, C. R., Butz, A. R., and Rojas, J. P. (2019). Perseverant grit and self-efficacy: Are both essential for children's academic success?. *Journal of Educational Psychology*, *111*(5), 877.

Valentine, J. C., DuBois, D. L., and Cooper, H. (2004). The relation between self-beliefs and academic achievement: A meta-analytic review. *Educational Psychologist*, *39*(2), 111-133.

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-6793 e- ISSN 2775-6815

Wong, T. T. Y. (2017). The unique and shared contributions of arithmetic operation understanding and numerical magnitude representation to children's mathematics achievement. *Journal of Experimental Child Psychology*, *164*, 68-86.

Zimmerman, B. J., and Schunk, D. H. (2021). Self-regulated learning and academic achievement: Theoretical perspectives. *Contemporary Educational Psychology*, *67*, 102025.

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-6793 e- ISSN 2775-6815