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Numeracy Skills in Economics and Business Students

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Abstract

One of the goals of SDG 4 in education is to improve numeracy, which is essential for everyday life. This study aims to examine the effects of effort, mathematics interest, mathematics anxiety, and mathematics self-efficacy on numeracy skills. The population of this study consisted of students from the Faculty of Economics and Business, Semarang State University. The sampling technique employed was random sampling, with a total of 94 students. Data were collected through a questionnaire distributed via Google Form and analyzed using descriptive statistics and multiple regression analysis. The results of the descriptive analysis show that effort has a very high average score, indicating that students strive to learn mathematics as much as possible. Meanwhile, numeracy skills, mathematics interest, mathematics anxiety, and mathematics self-efficacy all have high average scores. The regression analysis results indicate that effort and mathematics self-efficacy have a partial influence on numeracy skills, while mathematics interest and mathematics anxiety do not affect numeracy skills. This study suggests that students should continue to improve their numeracy skills, as they are highly important for both professional success and everyday life.

Keywords

numeracy skills; effort; interest; anxiety; self-efficacy

INTRODUCTION

The vision of Sustainable Development Goal 4 (SDGs 4) is to ensure inclusive, equitable, and quality education and promote lifelong learning opportunities for all, and education is envisioned as a driver of development and the achievement of all SDGs (UNESCO, 2024). This underscores the central role of education in empowering individuals and enabling sustainable progress across multiple sectors. SDGs 4.6 calls for a substantial increase in the number of youth and adults achieving literacy and numeracy (Murray, 2018). Achieving this target is crucial to ensure that individuals possess the foundational skills needed to access further education, secure employment, and participate fully in society.

Policies to support literacy and numeracy practices, lifelong learning, skills development, and participation in the workplace, community, and further education and training are essential (Reder et al., 2020). Such policies foster an environment where learning becomes a continuous process, adaptable to the evolving demands of modern life. The importance of literacy and numeracy as part of cross-sectoral reforms is evident from a social practice perspective (Murray, 2018). This approach highlights that literacy and numeracy are not merely academic skills but are deeply embedded in social, cultural, and economic contexts, influencing how individuals engage with and contribute to society.

One of the skills considered essential for job success is numeracy skills (Durrani & Tariq, 2012). Employers increasingly demand strong numeracy competencies as they are vital for decision-making, problem-solving, and productivity in the modern workforce. In general, numeracy is the ability to access, use, interpret, and communicate quantitative information and

ideas to participate in and manage quantitative demands in a variety of adult life situations (OECD, 2012).

It involves understanding and applying mathematical concepts to real-world issues, ensuring individuals can navigate complex information landscapes. Numeracy skills are the ability to manage data and numbers to solve problems in a variety of everyday life contexts (Yustitia et al., 2021). These skills empower individuals to make informed financial decisions, assess risks, and critically analyze data in their daily lives.

Strong numeracy skills are crucial for job success (Durrani & Tariq, 2012; Lamb et al., 2019; OECD, 2019). They enhance employability, open pathways to career advancement, and contribute to national economic competitiveness. The benefits of numeracy extend beyond the job market to our daily lives, from creating a household budget and saving for retirement to interpreting medical information critical to our health and well-being (Brumwell & Macfarlane, 2020). Thus, numeracy is a key life skill that supports both individual and societal well-being. Durrani & Tariq (2012a) highlighted the importance of graduates' numeracy skills and the extent to which employers use numeracy tests in graduate recruitment. Such assessments reflect the expectation that graduates, regardless of their field of study, possess essential quantitative reasoning abilities.

The results of the PIAAC Cycle 1 survey in Indonesia indicate that the majority of adults have poor literacy and numeracy skills (OECD, 2016). This presents a significant challenge for the country's workforce readiness and economic development, underscoring the urgent need for comprehensive educational reforms and targeted interventions to strengthen foundational skills.

Numeracy refers to the knowledge, skills, behaviors, and attitudes required by students to apply mathematics in various contexts, including students studying commerce, accounting, and economics who frequently use calculations, making numeracy crucial for their learning success (Singh et al., 2023). It enables learners to connect mathematical understanding with real-world applications, fostering problem-solving and critical thinking abilities essential for academic and professional achievement. Numeracy requires mathematics, which is a branch of accurate knowledge that systematically encompasses rules, concepts, reasoning processes, and abstract structures (Setiyani et al., 2024). A solid foundation in mathematical principles provides the tools necessary for students to analyze quantitative information effectively and make logical decisions. The implementation component of numeracy cannot be separated from the mathematical content (Putra et al., 2023). Therefore, enhancing numeracy involves not only mastering mathematical concepts but also developing the capacity to apply them flexibly and meaningfully in diverse situations.

Students' numeracy skills can be influenced by both internal and external factors (Trisnaningtyas & Khotimah, 2022). Internal factors include intellectual abilities, learning styles, numerical skills, verbal skills, and non-cognitive aspects. External factors include family, social media, school, and the social environment (Karmeliana et al., 2023). In addition, numeracy skills are also influenced by language skills, effort, mathematics interest, mathematics anxiety, mathematics self-efficacy, teachers' involvement in the learning process, time spent on the subject, and family support (Cao Thi et al., 2023).

Students in the Faculty of Economics and Business take a course in mathematical economics, which examines how mathematics is applied to economic cases. Therefore, research is needed to determine students' perceptions of the importance of numeracy skills and the internal factors that influence them. This study focuses solely on internal factors, as first-semester students taking mathematical economics are still at the beginning of their studies, and external factors have not yet been fully developed. The internal factors examined in this study include effort, mathematics interest, mathematics anxiety, and mathematics self-efficacy.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Numeracy involves the flexible and goal-oriented application of basic mathematical skills acquired through formal schooling to meet the demands of a given situation (Dion, 2014).

Numeracy skills refer to the ability to access, use, interpret, and communicate quantitative information and ideas in order to participate in and manage the quantitative demands of various aspects of adult life (OECD, 2012). Numeracy skills draw on familiar mathematical domains such as arithmetic, algebra, and geometry, as well as other general frameworks described in broader terms. Some of these skills are foundational, focusing on learned knowledge and procedures. These include practical skills, mathematical confidence, number understanding, mathematics in context, and prerequisite knowledge (Steen, 2003). The principles underlying the importance of discussions about improving students' numeracy skills are: 1) Numeracy skills are not limited to certain aspects of life; 2) Advanced mathematical skills are not required to be skilled in mathematics; 3) Becoming skilled in mathematics is a lifelong process; 4) Numeracy Skills are interconnected with other higher-order skills; 5) Numeracy Skills involve interactions with quantitative information that can be represented in various forms; 6) Beliefs and attitudes are part of Numeracy Skills (Brumwell & Macfarlane, 2020). Other numeracy skills operate at a higher cognitive level and represent abilities as essential and pervasive as reading and speaking. These include interpreting data, decision making, symbol understanding, logical thinking, and cultural appreciation (Steen, 2003).

Effort

Effort refers to the time and energy students expend to meet formal academic requirements set by teachers and/or schools (Carbonaro, 2005). Consistent learning effort can increase student engagement in the learning process and influence how they understand the material being taught. Students' perceptions of the effort they put into learning can impact achievement (Carbonaro, 2005; Dunlosky et al., 2020). Students who assess their effort positively tend to demonstrate higher motivation and better academic outcomes. Effort has a significant positive effect on numeracy skills (Cao Thi et al., 2023), so increasing effort in learning mathematics will contribute to the development of more optimal numeracy skills.

Mathematics Interest

Interest is a condition or situation related to an individual’s desires or needs (Azmidar et al., 2017). Student interest has a significant impact on learning, particularly on their attention and goals (Azmidar et al., 2017). Students’ interest and willingness to engage with mathematics, within the broader context of academic performance, are important to continuously develop (Ryan et al., 2022). A strong interest in mathematics encourages persistence, motivation, and a positive attitude toward problem-solving. Conversely, a lack of interest often results in decreased learning motivation and lower achievement. Efforts to enhance students’ interest in learning mathematics are a crucial mission with broad implications for both individual academic success and the advancement of society at large (Aselebe et al., 2024). Moreover, cultivating mathematics interest is closely linked to the development of numeracy skills, which are essential for academic, professional, and everyday life.

Mathematics Anxiety

Anxiety refers to stress, nervousness, lack of self-confidence, and sometimes fear (Raj Acharya, 2017). Anxiety is an emotional state that arises in everyday life situations and is inseparable from human survival (Cao Thi et al., 2023). In the academic context, anxiety is often rooted in the fear of facing subjects, including classes, homework, and exams (Velazco et al., 2021). This condition can reduce students’ concentration, motivation, and performance, ultimately hindering their academic progress. Specifically, mathematics anxiety is described as a feeling of tension or fear that interferes with an individual’s ability to manipulate numbers and solve mathematical problems in both daily life and academic settings (Tariq & Durrani, 2012). Such anxiety negatively impacts students’ learning processes in mathematics and even in other subjects (Cao Thi et al., 2023). It also contributes to a lack of interest in learning mathematics, as the subject is often associated with negative emotions by students (Aselebe et al., 2024). Anxiety is not merely a psychological barrier to solving mathematical problems; individuals experiencing math anxiety may also exhibit physical reactions, which in some cases can manifest as physical pain

(Aselebe et al., 2024). Therefore, addressing and reducing mathematics anxiety is critical to helping students build confidence, improve problem-solving abilities, and achieve better academic outcomes.

Mathematics Self-Efficacy

Self-efficacy refers to students' confidence and belief in their ability to complete academic tasks (Liem et al., 2008). It is also defined as an individual's belief in their capacity to produce a certain level of performance when facing challenges in life (Diseth et al., 2012). The relationship between high self-efficacy and academic achievement has been demonstrated in various contexts (Abuya et al., 2018), where self-efficacy is understood as an individual's assessment of their ability to take actions that can influence the outcomes of events or situations affecting their lives. Strengthening self-efficacy is therefore considered an important step in improving students' academic performance. The relationship between mathematics self-efficacy and student performance, although varying in reported correlation sizes, often depends on the type of self-efficacy measures used (Multon et al., 1991). Mathematics self-efficacy is also influenced by factors related to the structure of the educational system (Schulz, 2005), as well as students' prior experiences, motivation, and support from teachers and peers. Altogether, mathematics self-efficacy not only affects students' achievement but also shapes their persistence, resilience, and willingness to engage with challenging mathematical tasks.

From the description above, the hypothesis in this study is
H1 : Effort has a positive impact on numeracy
H2 : Mathematics interest has a positive impact on numeracy
H3 : Mathematics anxiety has a negative impact on numeracy
H4 : Mathematics self efficacy has a positive impact on numeracy

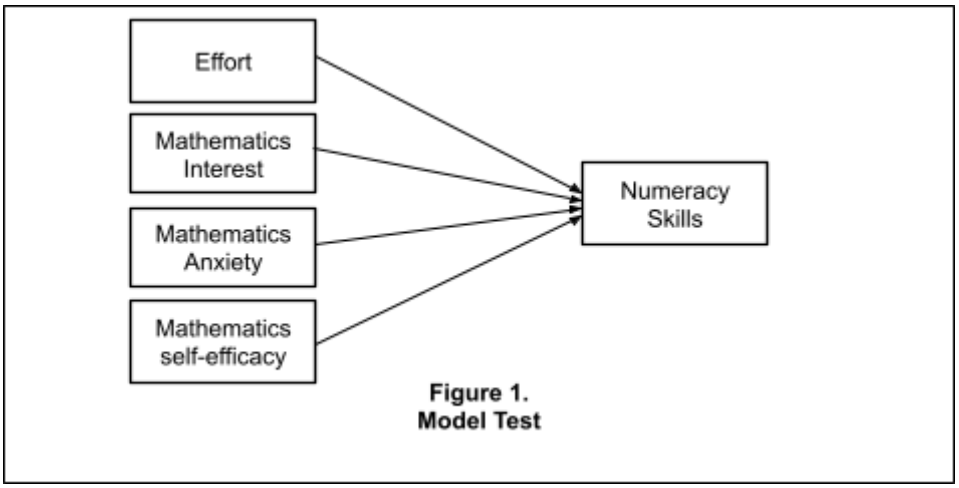

Figure 1.
Model Test

METHODS

The population of this study was 136 first-semester Accounting Education students. Random sampling was used, with 94 students selected. Data collection was conducted using a questionnaire via Google Forms. The questionnaire was tested for validity and reliability. The validity test used Pearson's product-moment correlation, where a statement item is considered valid if the sig value is <0.05. Conversely, if the sig value is >0.05, the item is considered invalid. Numeracy Skills were measured using 9 statements, Effort was measured using 5 statements, Mathematics Interest was measured using 4 statements, Mathematics Anxiety was measured using 6 statements, and Mathematics Self-Efficacy was measured using 5 statements. The validity test results showed a sig level <0.05, indicating that all statement items were valid.

Reliability testing using Cronbach's Alpha aims to measure the internal consistency of an instrument by examining how strongly the items relate to each other in measuring the same construct. The result is a reliability coefficient with a value between 0 and 1, with a higher value indicating greater reliability. An instrument is considered reliable if the Cronbach's Alpha value is

Table 1.
Reliability Test

>0.70 or higher. Based on the reliability test, a Cronbach's Alpha value > 0.70 indicates that all variables are reliable.

Data analysis used descriptive analysis and multiple regression analysis. Classical assumption tests were used to verify whether the model met the Best Linear Unbiased Estimator (BLUE) criteria, including normality, linearity, multicollinearity, and heteroscedasticity tests. Hypothesis testing used the t-test.

RESULTS AND DISCUSSION

Descriptive analysis is used to describe, summarize, and explain collected data, thereby facilitating an understanding of the basic characteristics of a phenomenon without making generalizations. The descriptive analysis includes measures such as the minimum value, maximum value, mean, and standard deviation.

Table 2.
Descriptive Statistics

The results of the descriptive analysis from 94 respondents show that the average numeracy skill score is 36.1596, categorized as high, indicating that students view numeracy skills as important for all areas of expertise as well as for everyday life. The average student effort score is 21.8936, categorized as very high, suggesting that students consider effort to be highly important in solving mathematical problems. The average mathematics interest score is 14.3191, categorized as high, demonstrating that students have a strong interest in learning mathematics. The average mathematics anxiety score is 21.9681, categorized as high, indicating that students still experience considerable levels of anxiety in learning mathematics. Meanwhile, the average mathematics self-efficacy score is 19.5319, categorized as high, showing that students have strong confidence in their ability to solve mathematical problems.

The normality test used in this study is the Kolmogorov-Smirnov test. This test is used to determine whether a set of data originates from a normally distributed population. The decision-making criterion is that if the significance value (p-value) is greater than 0.05 (α=0.05),

then the data are normally distributed; conversely, if it is less than 0.05, then the data are not normally distributed.

Table 3.
Normality Test (Kolmogorov-Smirnov Test)

Based on the Kolmogorov-Smirnov test, a sig. value of 0.200 > 0.05 indicates that the data are normally distributed.

Linearity analysis in a regression model is used to determine whether there is a significant linear relationship between the independent and dependent variables, or to verify whether the model specifications fit the data. This test is an essential prerequisite for conducting analyses such as correlation and linear regression, ensuring that the model's assumptions are met. Based on the ANOVA table, the linearity test is considered valid if the significance value for linearity is < 0.05, or if the significance value for deviation from linearity is > 0.05. In this study, linearity is assessed using significance values; if sig < 0.05, the model's assumption of linearity is satisfied.

Table 4.
Linierity Test

A multicollinearity test is used in multiple regression analysis to detect high correlations or strong linear relationships between two or more independent variables in the model. The purpose of this test is to ensure that the regression model is free from multicollinearity, which can lead to unstable regression coefficients and misleading interpretations. Multicollinearity is commonly assessed using the Variance Inflation Factor (VIF) and tolerance values, which can be obtained from regression analysis software such as SPSS. A high VIF value (greater than 10) or a low tolerance value (less than 0.1) indicates the presence of multicollinearity.

Table 5.
Multicollinearity Test

The multicollinearity test results show that all VIF values are less than 10 and all tolerance values are greater than 0.1, indicating that there is no multicollinearity among the variables.

The heteroscedasticity test is a classical assumption test in regression analysis that aims to determine whether there is inequality in the variance (a measure of data dispersion) of the residuals across observations in a regression model. A good regression model should be free

from heteroscedasticity, as its presence can reduce the efficiency of parameter estimation and compromise the reliability of statistical test results. The Glejser test is one method used to detect inequality in residual variances by regressing the independent variables against the absolute values (ABS) of the residuals from the main model and then examining their significance. If the significance value is greater than 0.05, heteroscedasticity is absent; if it is less than 0.05, heteroscedasticity is present, indicating that the regression model may not be valid as a forecasting tool. Based on the Glejser test results, all variables have significance values greater than 0.05, indicating the absence of heteroscedasticity.

Multiple linear regression analysis is a statistical technique used to model and examine the relationship between one dependent variable and two or more independent variables in order to predict the value of the dependent variable. This technique aims to determine both the direction and magnitude of the influence of each independent variable on the dependent variable, as well as to predict the dependent variable when the values of the independent variables are known. Based on the multiple regression analysis, the following results were obtained.

$$NS = 15.733 + 0.385E - 0.287MI - 0.012MA + 0.838MSE + e$$

Table 6.
Regression Analysis

Based on Table 6, the results can also be used to test the hypotheses. Hypothesis testing is assessed using the significance (sig) value, where if sig < 0.05, H_0 is rejected and H_a is accepted. The first hypothesis test shows a t-value of 2.756 with a sig of 0.007, indicating a positive influence of effort on numeracy skills. The second hypothesis test shows a t-value of -1.673 with a sig of 0.098, indicating that mathematics interest does not significantly influence numeracy skills. The third hypothesis test shows a t-value of -0.146 with a sig of 0.807, indicating that mathematics anxiety does not significantly influence numeracy skills. The fourth hypothesis test shows a t-value of 5.553 with a sig of 0.000, indicating a positive influence of mathematics self-efficacy on numeracy skills.

The regression equation for the first hypothesis shows a positive coefficient of 15.733 with a t-value of 2.756 and a significance level of 0.007. This indicates that effort has a positive effect on numeracy skills: the greater the effort, the better the students' numeracy skills. This finding is consistent with Cao Thi's (2023) which also demonstrates that effort positively influences numeracy skills. Furthermore, the descriptive analysis shows that students' effort falls into the very high category, indicating that they consistently strive to learn mathematics in order to improve their numeracy skills.

The regression equation for the second hypothesis shows a negative coefficient of -0.287 with a t-value of -1.673 and a significance level of 0.098, indicating that mathematical interest does not affect numeracy skills. This finding contradicts Cao Thi (2023), who found that mathematical interest has a positive effect on numeracy skills. However, it is consistent with (Ginne et al., 2024), whose results show that learning interest has no significant effect on understanding mathematical concepts. Weak conceptual understanding makes it difficult to apply mathematics in real-world contexts, thereby hindering the improvement of numeracy skills. The descriptive analysis also reveals that students' mathematical interest is categorized as high, yet it does not translate into enhanced numeracy skills.

The regression equation for the third hypothesis shows a negative coefficient of -0.012 with a t-value of -0.146 and a significance level of 0.807, indicating that mathematical anxiety has no effect on numeracy skills. This finding is inconsistent with Cao Thi (2023), who reported that mathematics anxiety negatively affects numeracy skills. However, it aligns with Ningsih (2019), whose study found that mathematics anxiety does not have a significant effect on working memory, and therefore does not influence numeracy skills. Based on the descriptive analysis, mathematics anxiety falls into the high category, yet it does not impact numeracy skills.

The regression equation for the fourth hypothesis shows a positive coefficient of 0.838 with a t-value of 5.553 and a significance level of 0.000, indicating that mathematical self-efficacy has a significant positive effect on numeracy skills. This finding is consistent with Cao Thi (2023), who also reported that mathematical self-efficacy positively affects numeracy skills. Based on the descriptive analysis, mathematical self-efficacy falls into the high category, suggesting that higher self-efficacy contributes to improved numeracy skills.

CONCLUSION

Numeracy skills in this study used students' perceptions of the importance of numeracy skills. The conclusion of this study is that effort and mathematics self-efficacy have a significant influence on numeracy skills. Meanwhile, mathematics interest and mathematics anxiety do not affect numeracy skills. Suggestions for further research could include experimental research where there is a threat used to improve numeracy skills. A limitation of this study is that it only used new students in accounting education, which could actually be conducted more widely across all study programs in the Faculty of Economics and Business.

Abuya, B. A., Mumah, J., Austrian, K., Mutisya, M., & Kabiru, C. (2018). Mothers' Education and Girls' Achievement in Kibera: The Link With Self-Efficacy. *SAGE Open*, *8*(1). https://doi.org/10.1177/2158244018765608

Aselebe, L. O., Farayola, P. I., & Aselebe, K. O. (2024). Promoting Undergraduates' Interest in Mathematics as a Discipline of Study in Tertiary Institutions: An Exploration of Pragmatic Strategies for Policy Decision. *European Journal of Training and Development Studies*, *11*(1), 61–69. https://doi.org/10.37745/ejtds.2014/vol11n16169

Azmidar, A., Darhim, D., & Dahlan, J. A. (2017). Enhancing Students' Interest through Mathematics Learning. *Journal of Physics: Conference Series*, *895*(1). https://doi.org/10.1088/1742-6596/895/1/012072

Brumwell, S., & Macfarlane, A. (2020). *Improving Numeracy Skills of Postsecondary Students: What is the Way Forward? The Higher Education Quality Council of Ontario Cite this publication in the following format*.

Cao Thi, H., Le, T. A., Tran Ngoc, B., & Phan Thi Phuong, T. (2023). Factors affecting the numeracy skills of students from mountainous ethnic minority regions in Vietnam: Learners' perspectives. *Cogent Education*, *10*(1). https://doi.org/10.1080/2331186X.2023.2202121

Carbonaro, W. (2005). Tracking, Students' Effort, and Academic Achievement. In *Source: Sociology of Education* (Vol. 78, Issue 1).

Dion, N. (2014). *Emphasizing Numeracy as an Essential Skill Nicholas Dion Higher Education Quality Council of Ontario The Higher Education Quality Council of Ontario*. www.heqco.ca

Diseth, Å., Danielsen, A. G., & Samdal, O. (2012). A path analysis of basic need support, self-efficacy, achievement goals, life satisfaction and academic achievement level among secondary school students. *Educational Psychology*, *32*(3), 335–354. https://doi.org/10.1080/01443410.2012.657159

Dunlosky, J., Badali, S., Rivers, M. L., & Rawson, K. A. (2020). The Role of Effort in Understanding Educational Achievement: Objective Effort as an Explanatory Construct Versus Effort as a

Student Perception. In *Educational Psychology Review* (Vol. 32, Issue 4, pp. 1163–1175). Springer. https://doi.org/10.1007/s10648-020-09577-3

Durrani, N., & Tariq, V. N. (2012). The role of numeracy skills in graduate employability. *Education and Training*, *54*(5), 419–434. https://doi.org/10.1108/00400911211244704

Ginne, Y., Kariman, D., & Yusri, R. (2024). The Influence of Learning Interest on Understanding of Mathematical Concepts in Class XI PH 1 Students at SMKN 6. *AlphaMath : Journal of Mathematics Education*, *10*(1), 1. https://doi.org/10.30595/alphamath.v10i1.19705

Karmeliana, D. S., Ladyawati, E., Kemampuan, A., Siswa, N., Menengah, S., Ditinjau, A., Gaya, D., & Abstrak, B. (2023). 166-186) Jurnal Riset Pendidikan dan Inovasi Pembelajaran Matematika ISSN. In *JRPIPM* (Vol. 6, Issue 2).

Lamb, D., University, R., & Chatoor, K. (2019). *Great Divide or Small Fissure? A Comparison of Skills, Education and Earnings across Standard and Non-standard Workers*. www.heqco.ca

Liem, A. D., Lau, S., & Nie, Y. (2008). The role of self-efficacy, task value, and achievement goals in predicting learning strategies, task disengagement, peer relationship, and achievement outcome. *Contemporary Educational Psychology*, *33*(4), 486–512. https://doi.org/10.1016/j.cedpsych.2007.08.001

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of Self-Efficacy Beliefs to Academic Outcomes: A Meta-Analytic Investigation. *Journal of Counseling Psychology*, *38*(1), 30–38. https://doi.org/10.1037/0022-0167.38.1.30

Murray, T. S. (2018). Headline 1 Functional Literacy and Numeracy: Definitions and Options for Measurement of SDG 4.6. In *Policy Research GAML Fifth Meeting* (Vol. 17).

OECD. (2012). *Literacy, Numeracy and Problem Solving in Technology-Rich Environments*. OECD. https://doi.org/10.1787/9789264128859-en

OECD. (2016). Jakarta (Indonesia) - Country Note - Skills Matter: Further Results From The Survey of Adult Skills. In *2016*. https://doi.org/10.1787/888933366458

OECD. (2019). *OECD Skills Strategy 2019 SKILLS TO SHAPE A BETTER FUTURE*.

Putra, Sukestiyarno, Masrukan, & Widodo, J. (2023). Numeration Problems in Elementary School Mathematics Learning in Semarang from the Teacher's Perspective. *Pegem Journal of Education and Instruction*, *13*(4), 63–74. https://doi.org/10.47750/pegegog.13.04.08

Raj Acharya, B. (2017). Factors Affecting Difficulties in Learning Mathematics by Mathematics Learners. *International Journal of Elementary Education*, *6*(2), 8. https://doi.org/10.11648/j.ijeedu.20170602.11

Reder, S., Gauly, B., & Lechner, C. (2020). Practice makes perfect: Practice engagement theory and the development of adult literacy and numeracy proficiency. *International Review of Education*, *66*(2–3), 267–288. https://doi.org/10.1007/s11159-020-09830-5

Ryan, V., Fitzmaurice, O., & O'donoghue, J. (2022). Student Interest and Engagement in Mathematics After the First Year of Secondary Education. *European Journal of Science and Mathematics Education*, *10*(4), 436–454. https://doi.org/10.30935/SCIMATH/12180

Schulz, W. (2005). *Mathematics Self-Efficacy and Student Expectations. Results from PISA 2003*.

Setiyani, Waluya, S. B., Sukestiyarno, Y. L., Cahyono, A. N., & Santi, D. P. D. (2024). Assessing numeracy skills on flat shapes and scaffolding forms in junior high school. *International Journal of Evaluation and Research in Education* , *13*(1), 422–432. https://doi.org/10.11591/ijere.v13i1.25186

Singh, D., Chand, S. P., Kumar, K. K., & Ali, R. (2023). Effectiveness of literacy and numeracy in commerce subjects among secondary schools in Fiji. *Journal of Education and Learning*, *17*(3), 447–454. https://doi.org/10.11591/edulearn.v17i3.20873

Steen, L. A. (2003). *Data, Shapes, Symbols: Achieving Balance in School Mathematics*.

Tariq, V. N., & Durrani, N. (2012). Factors influencing undergraduates' self-evaluation of numerical competence. *International Journal of Mathematical Education in Science and Technology*, *43*(3), 337–356. https://doi.org/10.1080/0020739X.2011.618552

Trisnaningtyas, N. O., & Khotimah, R. P. (2022). ANALISIS KEMAMPUAN LITERASI MATEMATIS DALAM MENYELESAIKAN SOAL AKM DITINJAU DARI GAYA BELAJAR. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *11*(4), 2714. https://doi.org/10.24127/ajpm.v11i4.5662

UNESCO. (2024). *Transforming Education Towards SDGG4 Report of a global survey on country actions to transform education*. http://www.unesco.org/open-access/terms-use-ccbysa-en

Velazco, D. J. M., Hinostroza, E. M. F., Martínez, M. F. C., & Liccione, E. J. (2021). MATHEMATICS ANXIETY AND ITS EFFECTS ON ENGINEERING STUDENTS' PERFORMANCE DURING THE COVID 19 PANDEMIC. *Journal on Mathematics Education*, *12*(3), 547–562. https://doi.org/10.22342/JME.12.3.13205.547-562

Yustitia, V., Tatag, S., & Abadi, A. (2021). The effect of mathematics self-efficacy on numeracy skills of prospective elementary school teachers. *Cypriot Journal of Educational Sciences*, *16*(6), 3394–3406. https://doi.org/10.18844/cjes.v16i6.6590