

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY: APPLIED BUSINESS AND EDUCATION RESEARCH

2025, Vol. 6, No. 2, 554 – 563

<http://dx.doi.org/10.11594/ijmaber.06.02.11>

Research Article

Challenges Encountered in Teaching Four Basic Operations in Mathematics and Academic Performance among Pupils

Estella S. Abregana¹, Bazil T. Sabacajan², Alexander N. Morados³, Wenie L. Nahial^{4*}

¹Mambajao Central School, Department of Education, Division of Camiguin, 9100, Philippines

²Department of Education, Division of Camiguin, Curriculum and Instruction Division, 9100, Philippines

³Camiguin Polytechnic State College, 9100, Philippines

⁴Camiguin Polytechnic State College, Institute of Arts and Sciences, 9100, Philippines

Article history:

Submission 31 January 2025

Revised 07 February 2025

Accepted 23 February 2025

*Corresponding author:

E-mail:

wenielunnahial@gmail.com

ABSTRACT

Mathematics is a learning discipline disliked by most of the learners in schools. This became more complicated when the learners transitioned from face-to-face to modular learning modality during the pandemic, and just recently from modular back to face-to-face learning modality. This study aimed to determine the extent of the challenges encountered by the respondents in teaching mathematics and the academic performance among the pupils. Using complete enumeration, all Grades 4 to 6 mathematics teachers in Mambajao District were used as respondents of the study. Quantitative descriptive research design was employed supplemented with survey questionnaire as the main data gathering tool. Appropriate statistical tools were used to analyse the collected data. Results showed that majority of the respondents were females, middle-aged, with at least 11 years of teaching experience, and with units in master's degree course program. The respondents had always experienced challenges in teaching mathematics to the learners, while the learners had a satisfactory academic performance. There was no relationship between the extent of the challenges encountered by the respondents and the academic performance of the learners. Finally, the study found no significant differences on the extent of the challenges encountered among the respondents when grouped in terms of age, sex, number of years of teaching, and highest educational attainment. The researcher recommended that future researchers may replicate this work with additional interesting variables.

Keywords: *Academic performance, Challenges, Basic operations in Mathematics*

How to cite:

Abregana, E. S., Sabacajan, B. T., Morados, A. N., & Nahial, W. L. (2025). Challenges Encountered in Teaching Four Basic Operations in Mathematics and Academic Performance among Pupils. *International Journal of Multidisciplinary: Applied Business and Education Research*. 6(2), 554 – 563. doi: 10.11594/ijmaber.06.02.11

Introduction

Effective communication between teacher and student is essential for teaching and learning mathematics, as well as for any other subject. As a result, learning how to create and communicate mathematical meanings using situational language necessitates more than simply being able to recognize and react to words independently. This requires the use of appropriate language (words and symbols) whose level of difficulty corresponds to the cognitive abilities of the learners in question (Mulwa, 2015).

Mathematics lessons in the elementary grades are noticeably different from those in the upper grades. Grades 4 to 6 mathematics teacher, like all other teachers at this level, must have the skills of a psychologist and educator in addition to their primary duties. This is so since during this period it entails not only the presentation of knowledge in various academic disciplines but also its psychological and personal upbringing (Ibrokhimovich, 2022).

Teachers in mathematics are currently dealing with issues related to teaching the mathematical concepts and ideas to the learners (Bray & Tangney, 2016). Moreover, translating mathematical concepts or language into the mother tongue was considered severe, according to Tundag et al. (2020). For this, the teachers face a significant challenge in ensuring that students master the basics in learning mathematics. Teachers must use innovative teaching methods to help their students develop their skills. There is a need for the purveyor of significant learning some internal skills to use teaching approaches, strategies, methods, and models (Darmayanti et al., 2022; Rahmah et al., 2022). Students' competencies and skills can be meaningfully developed by selecting appropriate, cutting-edge learning models and methods (Schiuma et al., 2022). For this, the teachers should develop innovative teaching strategies that align with the current needs to help students reach their full potential.

The global trend on the difficulty of teaching mathematics is also a challenge among the teachers in the Philippines. In the context of this work, the researcher observed that most of the learners in her class cannot perform the

four basic operations in mathematics, namely: addition, subtraction, multiplication and division. This motivated the researcher to determine the challenges of the mathematics teachers in teaching the four basic operations to the Grades 4 to 6 pupils in some schools in Camiguin.

Methods

This study used a quantitative survey design to ascertain the extent of the challenges encountered by teachers in teaching the four basic operations in mathematics to the Grades 4 to 6 learners in 19 elementary schools in DepEd-Camiguin. Prior to data gathering process, the researcher asked permission from the Office of the Schools Division Superintendent to conduct this study in the target schools. Ethical standards were also observed to keep the respondents safe at all times. The approval of the SDS was used in soliciting the support and cooperation of the school heads in this work. Consent form was secured prior to the distribution of the survey questionnaire.

Using complete enumeration sampling technique, a total of 47 mathematics teachers were used from the district of Mambajao. These respondents served as mathematics teacher for at least one year. The participation of the concerned teachers was also approved by the school heads before the researcher personally distributed the research instrument.

Prior to the formulation of the survey questionnaire, the researcher conducted a random interview to some of the teachers in DepEd-Camiguin about their challenges in teaching the four basic operations in mathematics. The research instrument was anchored in the study of Block and Pressley (2007) entitled *Best Practices in Teaching Comprehension*. This was tailored-fit to the context of the respondents based on the results of the interview about their challenges in teaching mathematics.

The research instrument was composed of two parts. First part requires the demographics of the respondents which are necessary to have an in-depth discussion of the findings of the study. While the second part was about the perception of the respondents about the challenges in teaching mathematics using 14 indicators. This instrument underwent a content

validation by a pool of experts from DepEd-Camiguin and select personnel from the Higher Education Institutions (HEIs) in the province of Camiguin. After this, pilot testing was conducted in some schools in the other districts of DepEd-Camiguin. Results showed that the items relating to challenges were good with a Cronbach's alpha value of 0.72 indicating the continuance of the usage of the instrument for the actual gathering of data. With this, the instrument was personally distributed to the respondents of the study. After a week, the survey questionnaire was retrieved and the responses were tallied ready for analysis. In analyzing the data, the objectives of the study served as guide in choosing the statistical tool to use. However, the assumptions of using the parametric test were checked in order to produce reliable results. Failure to meet the assumptions, non-parametric test was used to analyze the data.

Results and Discussions

The findings and analysis of data are presented here according to the inquiries of the study. These are shown in textual and tabular formats.

On the demographics of the respondents

Table 1 showed that thirty-five (35) out of forty-seven (47) respondents, or 74.47 percent of them were females. Only twelve (12), or 25.53 percent were males. This is a common observation in schools that the number of female teachers exceeded the male teachers. This also implies that females are now getting inclined to mathematics discipline, unlike the previous observations that males dominated in mathematics subject.

Table 1. Demographic Profile of the Respondents of the Study

Variables	Frequency Counts	Percentage (%)
Sex		
Male	12	25.53
Female	35	74.47
Total	47	100.00
Age		
20 to 30	3	6.38
31 to 40	13	27.66
41 to 50	15	31.91
51 and above	16	34.04
Total	47	100.00
Length of Teaching Experience		
1 to 5	11	23.40
6 to 10	7	14.89
11 to 20	9	19.15
21 and above	20	42.55
Total	47	100.00
Highest Educational Attainment		
Bachelor's Degree	9	19.15
With Master's Degree Units	34	72.34
Graduate of Master's Degree	3	6.38
With Doctoral Units	1	2.13
Total	47	100.00

The age distribution showed that 31 or 65.95 percent of the respondents came from the age group of 41 and above, comprising the middle-aged and old adults. Only 16 or 34.04

percent belonged to the age group of 20 to 40 considered as young adults. This indicates that a substantial portion of the respondents have likely accumulated considerable experience in

teaching the four basic operations in mathematics. It can be inferred that these teachers had already gained enough knowledge, skills, and instructional strategies in mathematics education. Their extensive teaching experience may likely contribute to more effective pedagogical approaches, better classroom management, and a deeper understanding of the challenges faced in teaching the four basic operations. Conversely, the smaller percentage of younger teachers suggests a potential need for support and professional development to enhance their skills in mathematics instruction (Hill et al., 2019).

The length of teaching experience among the respondents revealed that 18 or 38.29 percent gained expertise in teaching mathematics for having served at most 10 years. While a majority of 29 or 61.70 percent became veterans in teaching mathematics after serving for more than 10 years. These figures indicate that the respondents possessed diverse experiences in teaching the mathematics subject.

Finally, 34 or 72.34 percent of the respondents have already obtained units in their

master's degree program in education. This figure indicates that the teachers are now taking advantage of the master's degree program in education offered in the higher education institutes (HEIs) in Camiguin. The teachers would no longer travel outside the island province just to enroll in state colleges or universities in the mainland of Mindanao. Besides, the teachers now are becoming aware about the effect of having completed a graduate program in their teaching positions in the school.

Extent of challenges encountered in teaching four basic operations in mathematics

Fourteen indicators were used to capture the challenges of the respondents in teaching the four basic operations in mathematics. In the overall, the respondents similarly perceived that they had always experienced challenges in teaching mathematics ($M = 3.28, SD = 0.72$). This implies that similar challenges in teaching mathematics happened in the schools in DepEd-Camiguin.

Table 2. Extent of Challenges Encountered in Teaching Four Basic Operations in Mathematics (N=47)

Indicators	Mean	Description
Time allotment to teach as reflected in the class program	3.72	High Extent
Strategies and techniques used in teaching the basic operations in Mathematics	3.64	High Extent
Integration of basic operations in Mathematics across learning areas	3.51	High Extent
Handling learners with difficulty in learning Mathematics	3.47	High Extent
Pedagogy in teaching mathematical operations	3.43	High Extent
Getting support from the school head, colleagues, and experts in teaching Mathematics	3.40	High Extent
Class schedule set for numeracy remediation	3.36	High Extent
Developing contextualized learning materials in Mathematics	3.36	High Extent
Availability of supplementary materials at in teaching Mathematics operations	3.30	High Extent
Translating the basic operations in Mathematics into vernacular language MTB-MLE	3.26	High Extent
Pupil's attitude towards the basic operations in Mathematics	3.19	Moderate Extent
Parent's involvement in teaching basic operations in Mathematics at home	2.87	Moderate Extent
Availability of pupils' learning in Mathematics at home	2.85	Moderate Extent
Insufficient school budget appropriated in the production of learning materials	2.62	Moderate Extent
Weighted Mean	3.28	High Extent
Standard Deviation	0.72	

It can be gleaned in Table 2 that ten (10) of the indicators were at high extent, and only four (4) were at moderate extent. The respondents revealed that they had always experienced challenges on the time allotment of teaching mathematics ($M = 3.72$). This means that they did not have enough time to expound the mathematical concepts and ideas due to time constraints. This normally happens if the learners could not understand at once the lesson. This was followed by strategies and techniques in teaching mathematics ($M = 3.64$), and then the integration of basic operations in mathematics ($M = 3.51$). These indicators, according to the respondents, occurred because of the almost two years of modular learning delivery modality due to the pandemic. This is consistent with the study of Akar and Erden (2021) which found out the effect of distance learning education. The respondents also revealed that some of them are not majors in mathematics, which is supported in the study of Al-Sharah et al. (2021) which pointed out the need of the expertise of the teacher on the subject matter.

Moreover, the respondents also encountered challenges in handling the learners with difficulty in mathematics ($M = 3.47$), pedagogy in teaching mathematical operations ($M = 3.43$), getting support from the school head and colleagues ($M = 3.40$), schedule of numeracy remediation ($M = 3.36$), development of contextualized learning materials ($M = 3.36$), availability of supplementary materials ($M = 3.30$), and translation of the basic operations in the language of the learners ($M = 3.26$). These challenges encountered by the

respondents already occurred even before the pandemic. This only suggested that the interaction between the teacher and learners as well as the lack of support from fellow teachers and insufficient learning materials remain a challenge. This is supported in the studies of Kind (2009) and Mizzi (2013) which still pointed out that the expertise of the teachers in Mathematics and other related elements has been counted as challenges in the delivery of lessons to the learners.

However, the respondents had also challenges encountered at “moderate extent” suggesting that these were experienced sometimes. They noted pupil’s attitude towards the basic operations ($M = 3.19$), parent’s involvement in teaching the basic operations ($M = 2.87$), availability of learning space at home ($M = 2.85$), and insufficient fund of the school to produce learning materials ($M = 2.62$). The respondents confirmed that these challenges were at moderate extent since they found it not affecting the entire learning process. These challenges relate to the study of Saga and Agua (2021) which discovered the importance of parent’s involvement in the learning activities of the children, be it in school or at home.

On the academic performance of the learners

The ratings of the learners were taken and considered in the study to determine if it associates with the extent of challenges encountered by the teachers in teaching the four basic operations in mathematics.

Table 3. Academic Performance of the Learners ($N = 47$)

Rating Interval	Frequency Counts	Percentage (%)	Description
90 to 100	7	14.89	Outstanding
85 to 89	10	21.28	Very Satisfactory
80 to 84	16	34.04	Satisfactory
75 to 79	14	29.79	Fairly Satisfactory
Total	47	100	

**Overall Rating of the Learners: 82 (Satisfactory); Standard Deviation: 5*

Table 3 presents the average rating ($M = 82$) with a descriptive equivalence of “satisfactory” in the first and second quarters of school year 2022-2023. This implies that the learners

did a satisfactory work, with fewer errors, and normally acceptable piece of output. While the spread of the ratings ($SD = 5$) indicated that there were learners with ratings at the

extremes. This is evident in the distribution of the ratings in which 7 (14.89%) of the learners placed themselves at the outstanding level, and 14 (29.79%) at the fairly satisfactory level. While 10 (21.28%) achieved the very satisfactory performance, 16 (34.04%) at the satisfactory level.

The satisfactory performance level of the learners agrees to the findings of Schleicher (2019) which confirmed that the deterioration of the learners' performance in mathematics is occurring in almost all parts of the globe. According to the respondents, the performance of their learners could have been affected by the challenges encountered and the transition of the face-to-face learning delivery modality. While the study of Villani et al. (2018) agreed that there were reasons for learners not to fully grasp mathematics lessons in the class. However, Roblon et al. (2022) found out that the performance of the learners in the borderless classroom during the pandemic was good implying that the strategy being used worked well.

Test of significant relationship

The challenges in teaching the four basic operations in mathematics did not correlate to the academic performance of the learners

($r(s) = 0.05, p = 0.732$). There was no association between challenges and the ratings of the learners. The challenges encountered by teachers cannot affect the academic performance of the learners. The coefficient of determination suggested that the variation in the academic performance can be explained by 0.25 percent of the challenges in teaching mathematics. The satisfactory performance level of the learners could have been due to some other factors not accounted by the researcher. In the context of this work, this can be due to learners' adjustments on the transition process from modular to face-to-face learning modality, or other factors influencing the satisfactory academic performance of the learners.

This finding relates to the study of Geary et al. (2017) which pointed out that the ability of the learners in mathematics cannot be always attributed to the ability of the teacher to deliver the lessons. Similarly, Ocampo et al. (2023) also confirmed that not all the time the independent variable cause an effect or influence to the outcome variable. In this work, learners are transitioning from modular to face-to-face learning delivery modality. This can be a factor influencing the academic performance of the learners, not just the challenges encountered in delivering the lessons to the class.

Table 4. Relationship Between Challenges Encountered and Academic Performance

Comparison	r_s	p-value (2-tailed)	Statistical Decision
Challenges Encountered and Academic Performance	0.05	0.732	Failed to Reject H_0

Test of significant difference

The influence of the demographics on the extent of challenges encountered by the respondents was considered since it can add

more ideas and explanation about the inquiries. This can help expound the findings of this present work.

Table 5. Summary of the Test of Significant Difference on the Extent of Challenges Encountered in Teaching Four Basic Operations in Mathematics (N = 47)

Variable	df	H Statistic (χ^2)	P-value	Decision
Age	3	0.24	0.971	Failed to Reject H_0
Sex	1	0.20	0.652	Failed to Reject H_0
Years of Teaching Experience	3	2.33	0.057	Failed to Reject H_0
Highest Educational Attainment	3	7.11	0.068	Failed to Reject H_0

Table 5 displays no significant difference on the extent of the challenges encountered when grouped according to age ($\chi^2(3) = 0.24, p = .971$), sex ($\chi^2(1) = 0.20, p = 0.652$), length of teaching ($\chi^2(3) = 2.33, p = .507$), and highest educational attainment ($\chi^2(3) = 7.11, p = 0.068$). This happened since the respondents had similar perceptions at high extent on the challenges encountered in teaching the four basic operations in mathematics. The study of Ebebuwa-Oko (2010) supported that the age and sex of the teachers do not at all times influence the outcome variable. However, the present work contradicts to the study of Ventayen (2018) which found out that the teaching experience of the teachers acquired over the years can attribute difference in the results of the undertaking. The present also disagree the work of Mizzi (2013) which confirmed the influence of higher learning in the delivery of the lessons to the learners. However, majority of the respondents in this study already earned units in master's degree program in education. Regardless of the demographics, the study of Friolo and Mutya (2022) concluded that the challenges encountered in teaching the four basic operations in mathematics did not differ among the teachers in schools.

Conclusions

The challenges encountered by the respondents in teaching the four basic operations in mathematics during the transition from modular to face-to-face learning modality did not affect the academic performance of the learners. No sufficient evidence to prove that the satisfactory performance level of the learners was influenced by the high extent of the challenges encountered in teaching the math lessons. There is a gap as what affect the academic performance of the learners, which implies then that there were other factors not accounted by the researcher affecting the outcome variable. The demographics of the respondents did not also influence the extent of the challenges encountered in teaching the four basic operations during the transition period. The respondents had similar perceptions about the challenges they encountered in teaching the four basic operations in mathematics.

Recommendations

It is recommended that the officials of the education agency particularly the Schools Division of Camiguin may use the results of this work in improving the pedagogical capability of the teachers in teaching mathematics. The school heads are encouraged to conduct needs assessment of the teachers for support capability building to increase learners' performance in the local and international assessments. It is suggested that the teachers also examine the potential factors particularly those that can be controlled influencing the academic performance of the learners. Finally, future researchers may replicate this work provided potential factors or variables affecting the performance of the learners are included in the study.

References

- Akar, S. S., & Erden, M. K. (2021). Distance education experiences of secondary school math teachers during the pandemic: A narrative study. *Turkish Online Journal of Distance Education, 22*(3), 19-39.
- Al-Sharah, N., Awwad, S., Abd Hamid, J., Shukri, S. M., & Ariffin, I. A. (2021). EFL teachers' perceptions towards English language teaching during the pandemic: Jordanian perspective. *Eurasian Journal of Applied Linguistics, 7*(2), 171-185.
- Anderson, J. R. (2014). *Rules of the mind*. Psychology Press.
- Armanto, D. (2002). *Teaching multiplication and division realistically in Indonesian primary schools: A prototype of local instructional theory* (p. 309). University of Twente [Host].
- Ashcraft, M. H. (1992). Cognitive arithmetic: A review of data and theory. *Cognition, 44*(1-2), 75-106.
- Askew, M., Brown, M., Rhodes, V., Wiliam, D., & Johnson, D. (1997). The contribution of professional development to effectiveness in the teaching of numeracy. *Teacher Development, 1*(3), 335-356.
- Baroody, A. J., & Ginsburg, H. P. (1986). The relationship between initial meaningful and mechanical knowledge of arithmetic. *Conceptual and procedural knowledge: The case of mathematics, 75*, 112.

- Baroody, A. J. (1999). The roles of estimation and the commutativity principle in the development of third graders' mental multiplication. *Journal of Experimental Child Psychology*, 74(3), 157-193.
- Bjuland, R., & Mosvold, R. (2015). Lesson study in teacher education: Learning from a challenging case. *Teaching and teacher education*, 52, 83-90.
- Bray, A., & Tangney, B. (2016). Enhancing student engagement through the affordances of mobile technology: a 21st century learning perspective on Realistic Mathematics Education. *Mathematics Education Research Journal*, 28, 173-197.
- Cockroft, W. (1982). Mathematics counts: Report of the committee of inquiry into the teaching of mathematics in schools Her Majesty Stationery Office.
- Crooks, N. M., & Alibali, M. W. (2014). Defining and measuring conceptual knowledge in mathematics. *Developmental review*, 34(4), 344-377.
- Darmayanti, R., Sugianto, R., Baiduri, B., Choirudin, C., & Wawan, W. (2022). Digital comic learning media based on character values on students' critical thinking in solving mathematical problems in terms of learning styles. *Al-Jabar: Jurnal Pendidikan Matematika*, 13(1), 49-66.
- Friolo, R. V., & Mutya, R. C. (2022). Mathematics Teachers' Perception on Modular Distance Learning: A Phenomenological Study. *International Journal of Multidisciplinary: Applied Business and Education Research*, 3(9), 1607-1615.
- Geary, D. C., Nicholas, A., Li, Y., & Sun, J. (2017). Developmental change in the influence of domain-general abilities and domain-specific knowledge on mathematics achievement: An eight-year longitudinal study. *Journal of Educational Psychology*, 109(5), 680.
- Gueta, M. F., & Janer, S. S. (2021). Distance learning challenges on the use of self-learning module. *United International Journal for Research & Technology*, 2(07).
- Hill, H. C., Sleep, L., Lewis, J. M., & Ball, D. L. (2019). Assessing teachers' mathematical knowledge: What knowledge matters and what evidence counts? *Journal for Research in Mathematics Education*, 50(4), 390-423.
- Ibrokhimovich, F. J. (2022). Teaching Mathematics in Elementary School: Issues and Solutions. *Eurasian Journal of Learning and Academic Teaching*, 4, 84-87.
- Kind, V. (2009). A conflict in your head: An exploration of trainee science teachers' subject matter knowledge development and its impact on teacher self confidence. *International Journal of Science Education*, 31(11), 1529-1562.
- Lartec, J. K., Belisario, A. M., Bendanillo, J. P., Binas-o, H. K., Bucang, N. O., & Cammagay, J. L. W. (2014). Strategies and problems encountered by teachers in implementing mother tongue-based instruction in a multilingual classroom. *IAFOR Journal of Language Learning*, 1(1), n1.
- Logan, G. D., & Klapp, S. T. (1991). Automatizing alphabet arithmetic: I. Is extended practice necessary to produce automaticity?. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 17(2), 179.
- Luft, J. A., & Cox, W. E. (2001). Investing in our future: A survey of support offered to beginning secondary science and mathematics teachers. *Science Educator*, 10(1), 1-9.
- Martens, R., Hurks, P. P. M., Meijjs, C., Wassenberg, R., & Jolles, J. (2011). Sex differences in arithmetical performance scores: Central tendency and variability. *Learning and Individual Differences*, 21(5), 549-554.
- Mizzi, D. (2013). The Challenges Faced by Science Teachers When Teaching Outside Their Specific Science Specialism. *Acta Didactica Napocensia*, 6(4), 1-6.
- Mulwa, E. C. (2015). Difficulties Encountered by Students in the Learning and Usage of Mathematical Terminology: A Critical Literature Review. *Journal of Education and Practice*, 6(13), 27-37.
- Murphy, M. P. (2020). COVID-19 and emergency eLearning: Consequences of the securitization of higher education for post-pandemic pedagogy. *Contemporary Security Policy*, 41(3), 492-505.
- Ocampo, E. N., Mobo, F., & Cutillas, A. L. (2023). Exploring the Relationship Between

- Mathematics Performance and Learning Style Among Grade 8 Students. *International Journal of Multidisciplinary: Applied Business and Education Research*, 4(4), 1165 – 1172. doi: 10.11594/ijmaber.04.04.14
- Organisation for Economic Co-operation and Development. (2010). *PISA 2009 Results: What Students Know and Can Do: Student Performance in Reading, Mathematics and Science (Volume I)*. Paris: OECD Publishing.
- Oanh, N. T. K. (2016). *Đạy học bốn phép tính với số tự nhiên trong môn Toán ở tiểu học theo hướng phát triển năng lực* [Teaching four operations with whole number in Mathematics at primary school according to the competence development approach][Unpublished doctoral dissertation]. *The Vietnam National Institute of Educational Sciences*.
- Putra, Z. H., Putri, R. I. I., & den Hertog, J. (2011). Supporting First Grade Students Learning Number Facts up to 10 Using a Parrot Game. *Indonesian Mathematical Society Journal on Mathematics Education*, 2(2), 163-172.
- Rahmah, K., Inganah, S., Darmayanti, R., Sugianto, R., & Ningsih, E. F. (2022). Analysis of Mathematics Problem Solving Ability of Junior High School Students Based on APOS Theory Viewed from the Type of Kolb Learning Style. *INDOMATH: Indonesia Mathematics Education*, 5(2), 109-122.
- Roblon, A. B., Cano Jr., A. C., Miñoza, G. R., Recomo, J. C., Monares, J. T., Arriola, M. A., Polancos, Q. Y., & Mutya, R. C. (2022). Teaching Strategies and Students' Performance in Mathematics in a Borderless Classroom. *International Journal of Multidisciplinary: Applied Business and Education Research*, 3 (12), 2498 – 2508. doi: 10.11594/ijmaber.03.12.03
- Roussel, J. L., Fayol, M., & Barrouillet, P. (2002). Procedural vs. direct retrieval strategies in arithmetic: A comparison between additive and multiplicative problem solving. *European Journal of Cognitive Psychology*, 14(1), 61-104.
- Ruffell, M., Mason, J., & Allen, B. (1998). Studying attitude to mathematics. *Educational studies in mathematics*, 35(1), 1-18.
- Saga, E. S., & Agua, B. M. G. (2021). Readiness levels and challenges of secondary mathematics teachers in implementing modular distance learning in the new normal. *Journal of Research, Policy & Practice of Teachers and Teacher Education*, 11(2), 101-123.
- Sasanguie, D., De Smedt, B., Defever, E., & Reynvoet, B. (2012). Association between basic numerical abilities and mathematics achievement. *British Journal of Developmental Psychology*, 30(2), 344-357.
- Schiuma, G., Schettini, E., Santarsiero, F., & Carlucci, D. (2022). The transformative leadership compass: six competencies for digital transformation entrepreneurship. *International Journal of Entrepreneurial Behavior & Research*, 28(5), 1273-1291.
- Scheibling-Sève, C., Pasquinelli, E., & Sander, E. (2020). Assessing conceptual knowledge through solving arithmetic word problems. *Educational Studies in Mathematics*, 103(3), 293-311.
- Schleicher, A. (2019). *PISA 2018: Insights and Interpretations*. oecd Publishing.
- Siegler, R. S., & Crowley, K. (1994). Constraints on learning in nonprivileged domains. *Cognitive Psychology*, 27(2), 194-226.
- Tikhomirova, T., Malykh, A., & Malykh, S. (2020). Predicting academic achievement with cognitive abilities: Cross-sectional study across school education. *Behavioral sciences*, 10(10), 158.
- Tundag, S. A. (2014). *Problems Encountered by the Grade 2 Teachers in the Division of Dumaguete City in Teaching Mathematics Using Mother Tongue: A Basis For An Action Plan* (Doctoral dissertation, Foundation University).
- Treffers, A. (1991). Meeting innumeracy at primary school. *Educational Studies in Mathematics*, 22(4), 333-352.
- Xu, C., LeFevre, J. A., Skwarchuk, S. L., Di Lonardo Burr, S., Lafay, A., Wylie, J., ... & Simms, V. (2021). Individual differences

- in the development of children's arithmetic fluency from grades 2 to 3. *Developmental psychology*, 57(7), 1067.
- Van den Heuvel-Panhuizen, M. (2008). *Children learn mathematics: A learning teaching trajectory with intermediate attainment targets for calculation with whole numbers in primary school*. BRILL.
- Ventayen, R. J. M. (2018). Teachers' readiness in online teaching environment: a case of department of education teachers. *PSU Journal of Education, Management and Social Sciences*, 2(1).
- Villani, C., Torossian, C., & Dias, T. (2018). 21 mesures pour l'enseignement des mathématiques.
- Zhao, N., Valcke, M., Desoete, A., Burny, E., & Imbo, I. (2014). Differences between Flemish and Chinese primary students' mastery of basic arithmetic operations. *Educational Psychology*, 34(7), 818-837.