

# Effects of Video Tutorials on the Mathematics Achievement of Students in Modular Distance Learning

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**Abstract**—Mathematics video tutorials are great supplementary educational resources that can support and enhance learning amidst the pandemic. This study sought to determine the effect of Mathusay Math Tutorial (MMT) videos on the achievement of students in mathematics in modular distance learning. It made use of a Quasi-Experimental Pretest-Posttest design. Forty (40) Grade 10 students were purposively chosen to be part of this study. Twenty (20) of these students with mobile phones were assigned to the Mathusay Math Tutorial (MMT) group where they received video tutorials and self-learning modules named Adaptive Learning Materials (ALM) while the remaining 20 students were assigned to the Modular Print (MP) Group were only given ALM. The pretest and posttest results of the two groups were compared and analyzed. The achievement level of students in the MMT group increased compared to the MP group. Moreover, the results show that students exposed to MMT videos performed significantly better in the posttest compared to those who did not use it. MMT videos can potentially increase the students' achievement in mathematics.

**Keywords**—Mathematics Achievement, Mathusay Math Tutorial, Mean Percentage Score, Video tutorial.

## I. INTRODUCTION

Mathematics is one of the difficult subjects to learn even before the pandemic started (Lalian, 2019; Beltran, 2021). Many students are struggling in learning mathematics on their own and even the parents who assist their children at home shared the same struggles since they do not have the proper training in teaching mathematics concepts (Sawchuck & Sparks, 2020). Students do not have equal access to learning resources, which leads to mathematics learning loss (Haser et al., 2022).

Mathematics learning loss during this pandemic is increasingly disturbing. Sawchuck & Spark (2020) reported that “students would lose more grounds in math than in reading.” Hence, the teachers, administrators, and parents must work together to improve the content delivery of mathematics and lessen mathematics learning loss during the COVID-19 pandemic.

Filipino learners perform below average in Mathematics at almost all levels nationwide and in international assessments based on the results of National Achievement Tests (NAT), Programme for International Students Assessment (PISA) 2018, and Trends in International Mathematics and Science Study (TIMSS) 2019 (Gonzales, 2019; Department of

Education, 2019; Mullis et al., 2019). The mathematics performance of Filipino learners during this pandemic would likely hit rock bottom due to unequal access to quality education (UNICEF Philippines, 2021).

Using video tutorials to support the continuity of education become significant during this pandemic (Reimers et al., 2020). Video tutorials (video lessons) are instructional materials that “provide step-by-step guidance for specialized activities” (Tarquini & McDorman, 2019) that can help students to learn and acquire new skills. Worlitz et al. (2016) emphasized that video tutorials are effective tools to supplement teaching. Brame (2016) described video tutorials as important content-delivery tools which can be used in various learning modalities. It helps students learn a lot easier and lessons are more interesting and engaging than using print materials (Bevan, 2019). Cruse (2007) pointed out that the use of video lessons are effective tools that positively impact both academic and affective learning. With this educational tool, the student’s ability to understand and learn on their own can improve even when face-to-face classes are put on hold.

Video tutorials can make a “tangible difference to teaching and learning” (Carmichael et al., 2006). According to Carmichael et al. (2006), the use of video tutorials can stimulate greater academic achievement, improve learning engagement, and develop self-esteem. Ljubojevic et al. (2014) found that video tutorials have a positive effect not only on the students’ motivation to learn but also on students’ ability to learn independently. In learning mathematics, video tutorial “plays a role in improving students’ motivation in learning, enhancing students’ knowledge and understanding of the lesson and improving the students’ achievements” (Lalian, 2019). Sharma (2018) reported that students who were consistently watching instructional videos in mathematics performed better in the assessments than those who were in traditional instruction. Furthermore, students claimed that watching video tutorials improved their understanding of mathematics concepts (Sharma, 2018).

Teachers often use multimedia presentations as supplementary learning materials (Ljubojevic et al., 2014). Bullo (2021) as cited in Insorio and Macandog (2022) argues that video tutorials must be used as supplementary materials for modular distance learning. Beltran (2021) investigated the effect of using video tutorials as a supplement to self-learning

modules given to students in learning mathematics and found that video tutorials can potentially increase mathematics performance. Similarly, Insorio and Macandog (2022) used video tutorials as mathematics intervention in Modular Distance Learning to address the learning needs of the students struggling in using their self-learning modules. The results show that video tutorials “help students understand the mathematics concepts complementing lessons on the modules” (Insorio & Macandog, 2022).

Undoubtedly, since the school year 2020-2021 and up to the present, it is quite challenging both for learners and teachers. Most of the schools in the Philippines implemented modular distance learning (DepEd, 2020). However, this mode of teaching and learning does not guarantee that the students will learn as it is in the regular classes because some students complained of too much work while others continue to struggle without the guidance of their teachers to help them understand the lessons, especially in the remote area. Other regions in the country reported that students demonstrated low mastery of competencies in mathematics during modular distance learning (Beltran, 2021).

In the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), the digital divide remains a challenge (MBHTE, 2021). The region opted to use the Adaptive Learning Material (ALM), a learning module for home-based learning, and generally learners, and even parents who help their children at home shared the same sentiments and struggles in learning mathematics. This problem can result in poor academic performance in mathematics. To mitigate this, the teacher can develop and contextualize video tutorials that can be shared along with the ALM to help students learn on their own while answering their modules.

In the Basilan Schools Division, particularly in Tairan National High School, mathematics teachers developed segmented video tutorials for their students which are aligned with the Most Essential Learning Competencies (MELC) prescribed by the Department of Education (DepEd). Mathusay Math Tutorial (MMT), the YouTube channel introduced by Alviar (2020), have video lessons for Mathematics 9, 10, and General Mathematics. Alviar (2020) pointed out that having “these video lessons will help students become more independent and they can learn the concept and appreciate mathematics the way it should be learned in a face-to-face class.” Students used these video tutorials in mathematics since the beginning of the school year of 2020-2021. MMT videos were shared with the students during the distribution of the mathematics ALM. These video tutorials were used as supplement learning tools to help students learn mathematics and were complementing the lessons found in the learning modules. Initial reports show that students claimed that Mathusay Math Tutorial had a positive impact on their attitude towards mathematics and believed that their grades improved.

In this study, the Mathusay Math Tutorial videos were utilized as supplementary materials for modular distance learning. Two groups of Grade 10 students were compared: Mathusay Math Tutorial (MMT) Group and Modular Print (MP) Group. Students in the MMT group used video lessons

along with the ALMs in mathematics while the Modular Print group only used ALM as learning modules.

## II. RESEARCH QUESTIONS

The purpose of this study is to examine the effect of Mathusay Math Tutorial videos in enhancing students’ academic achievement in Mathematics.

Specifically, the study sought to answer the following questions:

1. Is there a significant difference between the pretest results of the students in the Mathusay Math Tutorial (MMT) Group and those of the Modular Print (MP) Group?
2. Is there a significant difference between the Pretest and Posttest results of the students in the Mathusay Math Tutorial (MMT) Group and those of the Modular Print (MP) Group?
3. Is there a significant difference between the Posttest results of the students exposed in the Mathusay Math Tutorial (MMT) Group and those of the Modular Print (MP) Group?

## III. METHODOLOGY

### *Research Design*

This study made use of a Quasi-Experimental Pretest-Posttest design to determine the effect of Mathusay Math Tutorial (MMT) videos on the achievement of the students in Mathematics. As cited in the study by Stratton (2019), the Pretest-posttest design is suitable for testing the effectiveness of intervention when two groups are being compared. In this study, two groups were compared: the MMT group and MP group. Both groups were given the pretest using the Arithmetic Sequence Test (ASeT) before the conduct of this study to measure their prior knowledge of the Arithmetic sequence. During the distribution of Adaptive Learning Materials (ALM), the MMT group was given Mathusay Math Tutorial videos as supplementary materials for ALMs in learning mathematics while the MP group was given ALMs only. Students in the MMT group were monitored and required to watch the videos provided to them. After three weeks, the students in the MMT and MP groups were given a posttest to assess students’ mathematics achievement on the Arithmetic Sequence.

### *Participants*

Forty (40) Grade 10 students were purposively chosen to be the respondents of this study. The twenty (20) students with mobile phones were assigned to the Mathusay Math Tutorial (MMT) group while those twenty (20) students who do not have gadgets were part of the MP group where they used the Adaptive Learning Materials (ALM). The MMT group used the ALM and the Mathusay Math Tutorial video lessons in learning arithmetic sequences. These students were enrolled at Tairan National High School for the School Year 2021-2022.

### *Data Gathering Procedure*

Before the conduct of this study, the list of Grade-10 students with and without phones was identified. The researchers sought permission from the school head of the

Tairan National High School. Upon approval, the researchers administered the Pre-test examination using the Arithmetic Sequence Test (ASeT) to the Grade-10 students of Tairan National High School. The test covered the learning competencies on Arithmetic Sequence under Patterns and Algebra. The results of the pre-test of both groups were recorded.

After giving the examination, the identified students with phones were given the ALM and Mathusay Math Tutorial videos as supplementary materials for learning while the students without phones were only given the ALM, modular printed material. MMT group was monitored and required to watch the video lessons given to them.

After three weeks, the Grade-10 students were given the same ASeT, Post-test, to determine if there is a significant difference in the achievement of the students who are using Mathusay Math Tutorial videos and those who do not use it. The Pretest and Posttest results were collected and analyzed using the appropriate statistical treatment.

*Research Instrument*

*Arithmetic Sequence Test (ASeT)*, a 40-item multiple-choice test with four (4) options had been used to measure students' mathematics achievement on Arithmetic Sequence. The ASeT was validated by three mathematics teachers from different schools in Basilan Schools Division. The ASeT was pilot tested with 30 non-participant students and the data were analyzed using R statistical packages. A Cronbach's Alpha coefficient for the instrument was .73 which means that the ASeT is acceptably reliable (Institute for Digital Research and Education Statistical Consulting, 2020). Also, the deletion of test items does not increase the reliability of the test. Meanwhile, the item analysis shows that the discrimination and difficulty index of the ASeT was .511 and .287 respectively, indicating that the test items were discriminating and the test is classified as good and average.

*Data Analysis*

The results of the pretest of the MMT and MP groups were tested for normality and homogeneity. The Shapiro-Wilk tests on pretest results of the MMT and MP groups showed no significant departure from normality. Likewise, the homogeneity of the pretest results of the MMT and MP groups via Levene's *F* Test was not significant, suggesting that there was no violation of the assumption of equal variances. Hence, an independent sample t-test was used to analyze if there was a significant difference between the pretest results of the students in the MMT group and MP group. Similarly, the pretest and posttest results of the MMT and MP groups were tested for normality and homogeneity. The Shapiro-Wilk test and Levene's *F* test show no significant departure from normality and no violation of the assumptions of equal variances was noted. Hence, a paired t-test was employed to determine if there was a significant difference between the Pretest and Posttest results of both the MMT and MP groups. To determine if there was a significant difference between the Posttest results of the MMT and MP groups, a Mann-Whitney U test was used since the posttest results of the MMT group

show a significant departure from normality. In this study, analyses were carried out using R Statistical Package.

The achievement or mastery levels were also determined through the Mean Percentage Score (MPS) of the pretest and posttest results of the students (DepEd Memorandum no. 160 series of 2012). The MPS can be calculated by dividing the computed mean score by the total number of items multiplied by 100. The Mean Percentage Scores were interpreted using the descriptive ratings: Mastery (96-100), Closely Approximating Mastery (86-95), Moving Towards Mastery (66-85), Average Near Mastery (35-65), Low Mastery (15-34), Very Low Mastery (5-14), and Absolutely No Mastery (0-4).

IV. RESULTS AND DISCUSSIONS

*Comparison of Pretest results of the MMT and MP Groups*

The pretest results of the students in the Mathusay Math Tutorial (MMT) and Modular Print (MP) groups were compared to determine if they have the same level of prior knowledge about the arithmetic sequence. Table 1 shows the summary statistics of the pretest results of the Mathusay Math Tutorial (MMT) and Modular Print (MP) groups.

Table 1. Summary Statistics of the Pretest results of the MMT and MP groups

Groups	N	Min	Max	Mean Score	Std. Deviation	MPS (%)
MMT	20	8	28	13.85	4.99	<b>34.63</b>
MP	20	6	22	14.25	4.74	<b>35.63</b>

Results show that the mean score of the MMT group is 13.85 with a standard deviation of 4.99 while the mean score of the MP group is 14.25 with a standard deviation of 4.74. Based on the MPS of the pretest results, the MMT group demonstrate Low Mastery (34.63) while the MP group demonstrate Average Near Mastery (35.63). However, the mean and standard deviation of the pretest scores of the MMT and MP groups are relatively close, indicating that the groups have the same prior knowledge in terms of the arithmetic sequence.

To determine if there is a significant difference in the pretest results of students who were exposed to the Mathusay Math Tutorial (MMT) and those of the Modular Print (MP) groups, a *t*-test was used. Table 2 presents the results of the *t*-test statistics between the pretest results of the MMT and MP groups.

Table 2. Comparison of Pretest results of the MMT and MP Groups

Group	N	Mean Score	Std. Deviation	T	df	Sig. (2-Tailed)	Interpretation
MMT	20	13.85	4.99	-0.25987	37.91	.7964	Not Significant
MG	20	14.25	4.74				

As shown in Table 2, there was no significant difference in the pretest results between the MMT group ( $M = 13.85, SD = 4.99$ ) and MP group ( $M = 14.25, SD = 4.74$ );  $t(37.91) = -0.25987, p = .7964$  (two-tailed). Thus, there was no significant difference in the prior knowledge of students in the



MMT and MP groups, showing that both groups have the same level of pre-existing subject knowledge.

*Comparison of Pretest-Posttest results of the MMT and MP Groups*

The pretest-posttest results of the students in the Mathusay Math Tutorial (MMT) and Modular Print (MP) groups were compared. Table 3 shows the summary statistics of the pretest-posttest results of the MMT and MP groups.

Table 3. Summary Statistics of the Pre-test and Post-test results of the MMT and MP group

Group	N	Pre-test			Post-test			Mean Gain
		M	MPS	SD	M	MPS	SD	
MMT	20	13.85	34.63	4.99	17.05	42.63	6.99	3.2
MP	20	14.25	35.63	4.74	12.7	31.75	3.97	-1.55

Results show that the mean score of pre-test results of the MMT group is 13.85 with a standard deviation of 4.99 while the mean score of the post-test results of the MMT group is 17.05 with a standard deviation of 6.99. The MPS of the MMT group increased from 34.63 (Low Mastery) to 42.63 (Average Near Mastery). The pre-test and post-test scores of the MMT group increased by 3.2, indicating that students who used Mathusay Math Tutorial videos in learning arithmetic sequences got more correct answers in the posttest. This shows that Mathusay Math Tutorial videos can improve the test score of the students when use as a supplement in modular distance learning. These findings are similar to Beltran (2021).

On the other hand, the mean score of pre-test results of the MP group is 14.25 with a standard deviation of 4.74 while the mean score of the post-test results of the MMT group is 12.7 with a standard deviation of 3.97. Looking at the achievement level of the MP group, the MPS of the posttest decreased from 35.63 to 31.75. As shown in the pretest and posttest mean scores of the MP group decreased by 1.55, indicating that students who were exposed to the modular print got lower scores in the post-test after three weeks the pre-test was administered. This shows that students in the Modular Print group demonstrated low mastery of the competencies for Arithmetic sequence.

To determine if there is a significant difference in the pretest and posttest results of students who were exposed to the Mathusay Math Tutorial (MMT) and Modular Print (MP) groups, a paired *t*-test was used. Table 4 presents the results of the *t*-test statistics between the pretest and posttest results of the MMT and MP groups.

Table 4. Comparison of Pre-test and Post-test results of the MMT Group

Test	Paired Differences					t	df	Sig. (2-Tailed)	Interpretation
	M	SD	Std Error Mean	95% confidence interval of the difference					
				Lower	Upper				
MMT Group Pretest-Posttest	3.2	5.23	1.169	-5.647	-0.754	-2.7376	19	0.0131	Significant
MP Group Pretest-Posttest	-1.55	4.56	1.04	-0.627	3.727	1.4905	19	0.1525	Not significant

As shown in Table 4, there was a significant difference in the pretest and posttest scores of the MMT group;  $t(19) = -2.7376, p = .0131$  (two-tailed). These findings show that the MMT group performed better in the posttest after the video tutorials were given to the students. Hence, the use of Mathusay Math Tutorial videos can potentially improve the academic performance of students in mathematics in modular distance learning. These findings are supported by the study of Sharma (2018), Lalian (2019), Huang (2020), Beltran (2021), and Insorio and Macandog (2022) that video tutorials can improve the academic achievements of students in mathematics.

Conversely, there was no significant difference in the pretest and posttest mean scores of the MP group;  $t(19) = 1.4905, p = .1525$  (two-tailed). These findings show that the modular print alone has a lesser impact on the learning of the students. In general, using modular printed materials alone have less effect on the academic performance of students in mathematics.

*Comparison of Posttest results of the MMT and MP Groups*

The posttest results of the students in the Mathusay Math Tutorial (MMT) and Modular Print (MP) groups were compared to determine if the use of Mathusay Math Tutorial videos for Mathematics 10 has an impact on the achievement of the students. Table 5 shows the summary statistics of the posttest results of the Mathusay Math Tutorial (MMT) and Modular Print (MP) groups.

Table 5. Summary Statistics of the Posttest results of the MMT and MP groups

Groups	N	Min	Max	Mean Score	Std. Deviation	MPS (%)
MMT	20	8	34	17.05	6.99	<b>42.625</b>
MP	20	5	20	12.70	3.97	<b>31.750</b>

Results show that the mean score of the MMT group is 17.05 with a standard deviation of 6.99 while the mean score of the MP group is 12.70 with a standard deviation of 3.97. On the other hand, the lowest and highest posttest scores in the MMT group are 8 and 34, respectively while the lowest and highest posttest scores in the MP group are 5 and 20, respectively. The mean score of the posttest of the MMT group was higher compared to the MP group by 10.875%. This indicates that the MMT group had more correct answers in the posttest compared to the MP group. Also, the MPS results revealed that students in the MMT group have a better mastery of the learning competencies than the MP group.

Conversely, the standard deviation of the posttest result of the MMT group is larger compared to the MP group. This shows that the posttest results of the MMT group are more spread out compared to the MP group. Even though the MP group has a lower standard deviation in the posttest, looking at the achievement level through the MPS, still the students in the MMT group scored higher compared to the MP group.

To determine if there is a significant difference in the posttest results of students who were exposed to the MMT and those of the MP groups, a Mann-Whitney U test was used.

Table 6 presents the results of the Mann-Whitney U test statistics between the MMT and MP groups.

Table 6. Comparison of Posttest results of the MMT and MP groups by Mann-Whitney U Test

Group	n	Rank Average	Rank Total	U	p	Interpretation
MMT	20	24.25	485	274.5	0.04465	Significant
MP	20	16.80	336			

As shown in Table 6, a Mann-Whitney U test indicated that the posttest result was greater for the MMT group ( $Mdn = 16$ ) than the MP group ( $Mdn = 13$ ),  $U = 274.5$ ,  $p = .04465$ . These results revealed that there was a significant difference between the posttest results of the students exposed to the MMT group and those of the MP group. A directional Mann-Whitney U test was carried out and the results showed that students in the MMT group performed significantly better than the MP group;  $U = 274.5$ ,  $p = .02233$ . Hence, the use of Mathusay Math Tutorial videos has a positive impact on the students' academic achievement in mathematics. Again, these findings are congruent with the study of Sharma (2018), Lalian (2019), Huang (2020), Beltran (2021), and Insorio and Macandog (2022) showing that students exposed to video tutorials performed significantly better than those who do not use it.

### V. CONCLUSIONS

Based on the findings, the following conclusions were drawn:

1. Students in the MMT and MP groups have the same level of prior knowledge of Arithmetic Sequence before the conduct of the study.
2. Mathusay Math Tutorial (MMT) videos as supplementary materials for modular distance learning can help students increase their assessment scores and improve their understanding of math concepts. Modular print alone is less effective in improving mathematics achievement. Hence, the teacher should provide supplementary materials to help students learn the concept presented in the modules.
3. Mathusay Math Tutorial (MMT) videos are effective in improving the mathematics achievement of students.

### VI. RECOMMENDATIONS

This study revealed the effect of the Mathusay Math Tutorial video lessons on the achievement of the students in mathematics. Hence, the following recommendations are hereby presented:

1. Consider using a random sampling technique in selecting respondents and test the effectiveness of the Mathusay Math Tutorial videos with a larger group of students.
2. Conduct an in-depth study on the impact of MMT videos on the retention skills of students.
3. Conduct ICT workshops or In-Service Training to promote the use of the Mathusay Math Tutorial videos.

4. Further explore the pedagogical effectiveness of Mathusay Math Tutorial videos by covering a unit or a quarter lesson.

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### REFERENCES

- [1] Alviar, J. V. (2020). Mathusay Math Tutorial. Retrieved from [www.youtube.com/mathusaymathtutorial](http://www.youtube.com/mathusaymathtutorial)
- [2] Beltran, R. S. (2021). Effectiveness of Modular and Video Lessons in Mathematics to the Performance of Grade 5 Pupils. *International Journal of Advanced Multidisciplinary Studies*, 1(4), 202-211. Retrieved from <https://www.ijams-bbp.net/wp-content/uploads/2021/12/IJAMS-December-25-researches-202-211.pdf>
- [3] Bevan, M. (2019). *Next Thought Studios*. Retrieved from Next Thought Studios: <https://www.nextthoughtstudios.com/video-production-blog/2017/1/31/why-videos-are-important-in-education>
- [4] Boateng, R., Boateng, S. L., Awuah, R. B., Ansong, E., & Anderson, A. B. (2016). *Videos in learning in higher education: assessing perceptions and attitudes of students at the University of Ghana*. Ghana: Smart Learning Environments. doi:DOI 10.1186/s40561-016-0031-5
- [5] Brame, C. J. (2016). *Effective Educational Videos: Principles and Guidelines for Maximizing Student Learning from Video Content*. *CBE—Life Sciences Education*. doi:10.1187/cbe.16-03-0125
- [6] Carmichael, M., Reid, A.-K., & Karpicke, J. D. (2006). *Assessing the Impact of Educational Video on Student Engagement, Critical Thinking, and Learning: The Current State of Play*. *SAGE Publishing*.
- [7] Cruse, E. (2007). *Using Educational Video in the Classroom: Theory, Research and Practice*. Retrieved from <https://www.safarimontage.com/pdfs/training/UsingEducationalVideoInTheClassroom.pdf>
- [8] Department of Education. (2019). *PISA 2018: National Report of the Philippines*. Retrieved from <https://www.deped.gov.ph/wp-content/uploads/2019/12/PISA-2018-Philippine-National-Report.pdf>
- [9] DepEd. (2020). Retrieved from [https://www.deped.gov.ph/wp-content/uploads/2020/07/DepEd\\_LCP\\_July3.pdf](https://www.deped.gov.ph/wp-content/uploads/2020/07/DepEd_LCP_July3.pdf)

- [10] DepEd Memorandum no. 160 series of 2012. (n.d.). *Maximizing Utilization of the National Achievement Test (NAT) Results to raise the achievement levels of low performing schools.*
- [11] Gonzales, E. (2019, December 29). YEAR-END REPORT: DepEd in 2019: The quest for quality education continues. Manila Bulletin. Retrieved from <https://mb.com.ph/2019/12/29/year-end-report-deped-in-2019-the-quest-for-quality-education-continues/>
- [12] Haser, Ç., Doğan, O., & Erhan, G. K. (2022, January). Tracing students' mathematics learning loss during school closures in teachers' self-reported practices. *International Journal of Educational Development*, 88. doi:<https://doi.org/10.1016/j.ijedudev.2021.102536>
- [13] Huang, M.-L. (2020, March 27). Interest-driven video creation for learning mathematics. Retrieved from <https://doi.org/10.1007/s40692-020-00161-w>
- [14] Insorio, A. O., & Macandog, D. M. (2022). Video Lessons via YouTube Channel as Mathematics Interventions in Modular Distance Learning. *Contemporary Mathematics and Science Education*, 3(1), 1-9. doi:<https://doi.org/10.30935/conmaths/11468>
- [15] Institute for Digital Research and Education Statistical Consulting. (2020, dec 17). Retrieved from <https://stats.idre.ucla.edu/spss/faq/what-does-cronbachs-alpha-mean/#:~:text=The%20alpha%20coefficient%20for%20the,most%20social%20science%20research%20situations.>
- [16] Lalian, O. N. (2019). The effects of using video media in mathematics learning on students' cognitive and affective aspects. *AIP Conference Proceedings*. Retrieved from <https://doi.org/10.1063/1.5061865>
- [17] Ljubojevic, M., Vaskovic, V., Stankovic, S., & Vaskovic, J. (2014, July 14). Using Supplementary Video in Multimedia Instruction as a Teaching Tool to Increase Efficiency of Learning and Quality of Experience. *The International Review of Research in Open and Distance Learning*, 15(3). Retrieved from <https://files.eric.ed.gov/fulltext/EJ1033049.pdf>
- [18] MBHTE. (2021). Adaptive Learning Materials.
- [19] Moreno-Guerrero, A.-J., Aznar-Díaz, I., Cáceres-Reche, P., & Alonso-García, S. (2020, May 22). E-Learning in the Teaching of Mathematics: An Educational Experience in Adult High School. *Multidisciplinary Digital Publishing Institute*, 8(840), 1-16. doi:10.3390/math8050840
- [20] Mullis, I. V., Martin, M. O., Foy, P., Kelly, D. L., & Fishbein, B. (2019). *TIMSS 2019 International Results in Mathematics and Science*. TIMSS & PIRLS International Study Center, Lynch School of Education and Human Development, Boston College and International Association for the Evaluation of Educational Achievement (IEA). Retrieved from <https://www.iea.nl/sites/default/files/2021-01/TIMSS%202019-International-Results-in-Mathematics-and-Science.pdf>
- [21] Reimers, F., Schleicher, A., Saavdra, J., & Tuominen, S. (2020). *Supporting the continuation of teaching and learning during the COVID-19 Pandemic*. Retrieved from <https://www.oecd.org/education/Supporting-the-continuation-of-teaching-and-learning-during-the-COVID-19-pandemic.pdf>
- [22] Sawchuck, S., & Sparks, S. D. (2020). *Kids Are Behind in Math Because of COVID-19. Here's What Research Says Could Help*. Retrieved from <https://www.edweek.org/teaching-learning/kids-are-behind-in-math-because-of-covid-19-heres-what-research-says-could-help/2020/12>
- [23] Sharma, K. J. (2018). Effects of Instructional Videos and Real-Life Mathematics Activity on Student Achievement and Attitude in a Community College Transitional Mathematics Course .
- [24] Stratton, S. J. (2019, December). Quasi-Experimental Design (Pre-Test and Post-Test Studies) in Prehospital and Disaster Research. *Cambridge University Press*, 34(6), 573 - 574. doi:<https://doi.org/10.1017/S1049023X19005053>
- [25] Tarquini, G., & McDorman, R. E. (2019). Video tutorials: an expanding audiovisual genre. *The Journal of Specialised Translation*(13). Retrieved from [https://jostrans.org/issue32/art\\_tarquini.pdf](https://jostrans.org/issue32/art_tarquini.pdf)
- [26] UNICEF Philippines. (2021, August 25). *UNICEF Philippines*. Retrieved February 24, 2022, from UNICEF Philippines: <https://www.unicef.org/philippines/press-releases/filipino-children-continue-missing-education-opportunities-another-year-school>
- [27] Worlitz, J., Stabler, A., Peplowsky, S., & Ralf, W. (2016, September 04). *Video Tutorials: An Appropriate Way of Teaching Quality Management Tools Applied with Software*, p. 182 Of 184. doi:DOI: 10.12776/QIP.V2012.754