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**EFFECT OF FLIPPED CLASSROOM ON THE PERFORMANCE IN MATHEMATICS OF
LEARNERS:
A LITERATURE REVIEW**

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ABSTRACT

Learning Mathematics during the pandemic became much more challenging than before. There were a lot of adjustments needed to be considered as the educational curriculum also changed due to the situation faced by teachers and learners. These changes may lead to misunderstanding of the concept, misinterpretation of the lesson or as worse as laziness to learn Mathematics for the students. This review paper aimed to review various articles that explain the effect of flipped classrooms on the performance in Mathematics of learners. Specifically, it aims to identify the research gap pertaining to the use of flipped classrooms in teaching Mathematics. It reviewed articles published in on-line international journals from 2011 to 2021. The review focuses on the findings and conclusions of the articles reviewed.

Keywords: Effect, flipped classroom, performance in Mathematics of learners

INTRODUCTION

Seeing numbers and figures can be a fortune or stress for learners depending on their interest. Learners need to be motivated so that they will have interest in the subject. Moreover, it is about how they see the worth of the subject and lessons on their daily living. For some, they might think it will be necessary because they can apply the knowledge in the future. On the other hand, some will just take it for granted as they have that belief that they will not be using it instead.

However, we can see the essence of learning Mathematics as we apply its contexts to everyday living. It is like how we are taking our food because we are using it in our daily activities. Learning Mathematics might be fun if you find the reason for dealing with it or some will look at how they are being motivated to learn the subject. It can also be a form of recreation for some people who love doing Mathematics as they enjoy doing the stuff about it and are interested in applying the concept to the daily activities they are into. Otherwise, it will be of great fear for the learners who have issues about the subject since day one. When we are doing Mathematics, it should be taken somehow seriously as it is a process. Once you will miss the first concept, there will be a higher possibility of having troubles on the next stages of the subject. It is a process wherein you need the basics of this subject in order to be particular to the next steps.

During this pandemic, learning Mathematics is not just about the learners involved but also to the strategies made by the teachers. This pandemic makes it harder for each party as there's a lot of factors to be considered. One of those is on how learning can be delivered properly and effectively. It is also how teachers can make the subject more accessible even if they are learning offline or without internet connection because meaningful learning requires active teaching and learning approaches. (Alemu, 2010)

Beheshti, Taspolat, Kaya, and Sapanca (2018) discussed that instructional videos play significant roles in learning today as we integrate the traditional class and the mode of delivery of information especially for online and blended classrooms. It is also a part of being in the 21st century to be more exposed to how learning can be done easier and accessible at any time of the day or anywhere. In addition, according to Mutodi and Ngirande (2014), one of the factors that influences a student's performance in Mathematics is teacher support/learning material. Thus, it can be on the given materials wherein the students can be good or bad in learning Mathematics. In this new normal education, we need to consider the strengths and weaknesses of the learners in the way of considering the limited time we are teaching a specific topic. Some can easily grasp the ideas in just an hour while others need more time to grasp the ideas provided by the teachers.

This literature review expands the researchers' knowledge and understanding of the studies through reviewing related articles in connection with the effect of flipped classrooms in Mathematics performance of the learners. It will also be of great help for the future researchers who may opt to conduct similar studies related to the presented topic.

LITERATURE REVIEW

Flipped Classroom

Bishop and Verleger (2013) defined flipped classroom as a way of utilizing asynchronous video lectures and giving homework in the form of practice problems. It is also an active way of giving activities to the learners to be done by group. This is a strategy of giving the idea to the students before teaching the topic. In addition, it is an approach of replacing the traditional lecture technique with active class works given before the discussion, while on discussion and after the discussion. (Abeysekera and Dawson, 2015)

Furthermore, according to Cilli-Turner (2015), a flipped classroom is a type of active learning where learning activities will be focused on the class time and the transfer of the learning content happens in advance outside the classroom. This is also supported by the study conducted by Wei, Cheng, Chen, Yang, Liu, Dong, Zhai, and Kinshuk (2020) on the effect of the flipped classroom on the mathematics performance of middle school students. The result of their study showed that flipped classroom approach improves the students' performance in Mathematics. Their study stressed that the flipped classroom approach is more effective for those who are in the middle Mathematics level compared to those at high or low levels. Thus, they suggested that flipped classrooms should be used more effectively by the teachers as they need to consider the needs and interests of the students as well as individual differences existing among the learners.

Makinde and Yusof (2017) in their published article on the Flipped Classroom: Its Effects on Students' Performance and Retention in Secondary School Mathematics Classroom, the result showed that there is an improvement on the retention of the students towards learning Mathematics using videos on a flipped classroom. This study also recommended the teachers to be inspired in using flipped classrooms as it will be of great help for the students. However, Wang and Antonenko (2017) in their published article on Instructor Presence in Instructional Video: Effects on visual attention, recall, and perceived learning found out that the presence of the teacher in the video lessons is more effective on student's learning and led to a lower-level of self-reported mental effort for the topics that are difficult for the learners. Furthermore, Yorganci (2020) published a study on Implementing flipped learning approaches based on 'first principles of instruction' in mathematics courses.

The result revealed that there is a positive effect on the learning process of the students using flipped learning approaches in Mathematics courses. This approach was then suggested to be used for instruction Mathematics for the betterment of performance of students in Mathematics.

On the other side of the coin, a survey on *The Flipped Classroom: A Survey of the Research* conducted by Bishop and Verleger (2013) revealed that students tend to prefer lectures of the teachers in person over video lectures. However, students also preferred to have interactive classrooms rather than having traditional lectures. Thus, evidence suggests that the learning of students using flipped classrooms has improved when compared to the traditional one. This means that the students tend to be more proactive when they are exposed to something new and in the way that they were discovering things through application of the knowledge gained.

According to the study conducted by Love, Hodge, Grandgenett and Swift (2013) on Student learning and perceptions in a flipped linear algebra course, the result revealed that students in the flipped classroom environment performed better than those in the traditional lecture. The students were very positive about the collaboration and appreciated instructional videos in the flipped classroom. This implies that collaboration among students makes it much more convenient in learning and doing specific tasks as more heads and hands are working at the same time. For instructional videos, especially when learning Mathematics, it is very important as it helps the teacher to minimize the time of teaching the topic and makes it more accessible for the learners to do self-paced learning. In addition, teachers and students were positive about the experiences where students were motivated as they were participating in the mathematics resources prepared and created by their teacher. (Muir and Geiger, 2016)

Instructional Videos

Instructional videos are digitally-made materials by the teachers or educators where they are recording their lessons. It is considered one of the strategies done by teachers today to conserve time and effort of teaching. Furthermore, one of the ways where students can understand the lesson further on their end. The following studies were reviewed to determine the effects of instructional videos on the performance in Mathematics of learners.

In the study conducted by AIP Conference Proceedings (2018), it revealed that the use of videos as a learning media in mathematics plays a role in student's performance as it improves the motivation of the learners towards learning as well as student's understanding of the lesson.

On the other hand, Sharma (2018) conducted a study on the effects of instructional videos and real-life mathematics activity on student achievement and attitude in a community college transitional mathematics course in New York City. Based on the result, the classes having consistent exposure to videos and real-life activities have much greater achievement in Mathematics than that of receiving only some special instrument treatments.

Modules

Jazim, Anwar and Rahmawati (2017) in their published study on The Use of Mathematical Module Based on Constructivism Approach as Media to Implant the Concept of Algebra Operation revealed that it was very effective to use constructivism based Mathematics module to improve the understanding of the students on algebra operation material. Thus, learning Mathematics using modules tends to make students with high academic ability to be more active during discussion as they already have an idea about the topics to be discussed.

Likewise, Muhtadi, Kartasasmita and Prahmana (2017) conducted a study about The Integration of technology in teaching mathematics. The result showed that instructional materials were important to the students as they have their engagement of using these materials to their daily learning activities. Furthermore, they used these materials for providing feedback over the course materials as they were doing self-paced learning. These online instructional modules helped them be much more organized in gaining knowledge of the subject as modules were provided with instructions necessary in self-paced learning. Using the modules as supplemental material to classroom lectures were also shown on survey results that were still indicative of student's approval.

In addition, Rahmawati, Lestari and Umam (2019) published a study about Analysis of the Effectiveness of Learning in the Use of Learning Modules Against Student Learning Outcomes. Based on the result, it showed that students who were using modules have a higher average in learning Mathematics than those who did not use modules.

CONCLUSION AND RECOMMENDATION

The preliminary data analysis suggests that flipped classrooms affect the performance of the learners in Mathematics. However, there is an insufficiency of studies of what specific flipped classroom strategy teachers should be using to be more effective in teaching Mathematics. For the subject matter of the study, it is very important to consider the availability of the materials that can be used for flipped classroom strategies. Thus, it is

recommended to conduct further studies on the other factors that are related to using flipped classroom strategies in relation to the performance of learners in Mathematics.

REFERENCES

- Alemu, B. M. (2010). *Active learning approaches in mathematics education at universities in Oromia, Ethiopia* (Doctoral dissertation).
- Beheshti, M., Taspolat, A., Kaya, O. S., & Sapanca, H. F. (2018). Characteristics of Instructional Videos. *World Journal on Educational Technology: Current Issues*, 10(1), 61-69.
- Mutodi, P., & Ngirande, H. (2014). The influence of students' perceptions on Mathematics performance. A case of a selected high school in South Africa. *Mediterranean Journal of Social Sciences*, 5(3), 431.
- AIP Conference Proceedings 2019, 030011 (2018). The effects of using video media in mathematics learning on students' cognitive and affective aspects; <https://doi.org/10.1063/1.5061864>
- 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; <https://academiccommons.columbia.edu/doi/10.7916/D80C6CQ2/download>
- Wei, X., Cheng, I., Chen, N. S., Yang, X., Liu, Y., Dong, Y., & Zhai, X. (2020). Effect of the flipped classroom on the mathematics performance of middle school students. *Educational Technology Research & Development*, 68(3).
- MAKINDE, S. O., & Yusuf, M. O. (2017). The Flipped Classroom: Its Effects on Students Performance and Retention in Secondary School Mathematics Classroom. *International Journal of Innovative Technology Integration in Education*, 1(1), 117-126.
- Wang, J., & Antonenko, P. D. (2017). Instructor presence in instructional video: Effects on visual attention, recall, and perceived learning. *Computers in human behavior*, 71, 79-89.
- Yorganci, S. (2020). Implementing flipped learning approach based on 'first principles of instruction' in mathematics courses
- Jazim, Anwar, R. B., & Rahmawati, D. (2017). The Use of Mathematical Module Based on Constructivism Approach as Media to Implant the Concept of Algebra Operation. *International Electronic Journal of Mathematics Education*, 12(3), 579-583.

- Bishop, J., & Verleger, M. A. (2013, June). The flipped classroom: A survey of the research. In *2013 ASEE Annual Conference & Exposition* (pp. 23-1200).
- Abeysekera, L., & Dawson, P. (2015). Motivation and cognitive load in the flipped classroom: definition, rationale and a call for research. *Higher education research & development*, 34(1), 1-14.
- Bishop, J., & Verleger, M. A. (2013, June). The flipped classroom: A survey of the research. In *2013 ASEE Annual Conference & Exposition* (pp. 23-1200).
- Cilli-Turner, E. (2015). Measuring learning outcomes and attitudes in a flipped introductory statistics course. *Primus*, 25(9-10), 833-846.
- Love, B., Hodge, A., Grandgenett, N., & Swift, A. W. (2014). Student learning and perceptions in a flipped linear algebra course. *International Journal of Mathematical Education in Science and Technology*, 45(3), 317-324.
- Muir, T., & Geiger, V. (2016). The affordances of using a flipped classroom approach in the teaching of mathematics: a case study of a grade 10 mathematics class. *Mathematics Education Research Journal*, 28(1), 149-171.
- Rahmawati, R., Lestari, F., & Umam, R. (2019). Analysis of the effectiveness of learning in the use of learning modules against student learning outcomes. *Desimal: Jurnal Matematika*, 2(3), 233-240.
- Muhtadi, D., Kartasasmita, B. G., & Prahmana, R. C. I. (2017, December). The Integration of technology in teaching mathematics. In *Journal of Physics: Conference Series* (Vol. 943, No. 1, p. 012020). IOP Publishing.

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