



**EFFECTIVENESS OF USING ONLINE GAMES IN TEACHING
MATHEMATICS**

© GSJ

ADORA FAITH C. PATAG

STUDENT

UNIVERSITY OF RIZAL SYSTEM

ANTIPOLO CITY

ABSTRACT

As the field of digital games and simulations is ever maturing, this study attempts to know the effectiveness of online games in teaching mathematics in any grade level and to systematically review the literature relevant to games and simulations pedagogy in teaching. The availability of technology in academic settings has allowed for diverse and active teaching approaches. This includes videos, web-based instruction, and interactive online games. In this quantitative pre-experimental analysis, the learning and retention of students, who participated in an interactive online learning experience, were assessed. The results suggest that student use of these tools may enhance their learning. Furthermore, the students felt that the sites were appropriate, beneficial to them, and easy to use. Thus, the use of online, interactive games may be effective in reinforcing lecture materials. This may help the schools in assessing and finding out the impact of online games that are relevant to their topics/subjects on the performance and social behavior of the students. This needs to be further assessed in a larger sample size.

Key Words

-Effectiveness of online educational games

-Teaching using online applications

-Teacher's methods

INTRODUCTION

It is undeniable that there has been a big change in the education system ever since the COVID – 19 pandemic started. Most countries around the world have temporarily closed educational institutions to contain the spread of the virus and reduce infections (Tria, 2020). Face-to-face engagement of students and teachers within the school has also been suspended. The Philippines is in the process of adapting to the new normal form of education at present, and continuous innovations of educators and active involvement of other stakeholders are the driving force for its success. So then, For the continuity of education and for every school to still attain its mission and vision which is to provide quality education to every Filipino learner, the Department of Education implemented Modular Distance Learning, Online Distance Learning, and Blended Learning. This new way of teaching includes different strategies such as videos, web-based instruction, and interactive online games that may help to retain the learning in the learner's mind.

Students are more active when it comes to online games. With just a click of a button or tapping the screen it led them to a whole different variety of games. According to DeBell and Chapman (2006), of 58,273,000 students of nursery and K-12 school age in the USA, 56% of students played computer games. Along with the popularity among students, computer games have received a lot of attention from educators as a potential way to provide learners with effective and fun learning environments (Oblinger, 2006). With this, professionals and the game industry started developing different online games that will be useful in teaching and help teachers to catch the attention of the learners. Gee (2005) agreed that a game would turn out to be good for learning when the game is built to incorporate learning principles. Some researchers have also supported the potential of games for affective domains of learning and fostering a

positive attitude towards learning (Ke, 2008). However, this strategy may have pros and cons since there are a lot of distractions that they may encounter online. Furthermore, it is not just about the distraction online but with the subject matter also. Students' attitude towards mathematics subjects is mostly negative, with that, it may affect their performance in doing activities.

Here are some of the positive results of using online games in teaching mathematics including the improving of Hand-Eye Coordination, Quick Thinking skills, Mood improvement, Concentration, and better teamwork of the students. However, there are also negative effects of using online games in teaching, such as students' attitude towards the subject, gender, and poor academic performance.

Although extensive studies have been done on online educational games worldwide, a wide gap still exists in studies focusing on the effectiveness of online games in students learning certain subjects in schools. For this reason, this study aims to find out that online educational games are effective when it comes to teaching mathematics subjects based on the students' performance. Some studies concluded, students involved in mathematics games perceived statistically significantly more teacher support, involvement, personal relevance, enjoyment of mathematics lessons, and academic efficacy.

LITERATURE REVIEW

In mathematics, educational games are recognized as suitable to promote mathematical achievements in various domains, e.g., problem-solving and algebra skills, strategic and

reasoning abilities, geometry skills, arithmetic, and critical thinking. These studies mainly focused on game-based learning's influences on mathematical achievements in the form of knowledge. But other parts of mathematics education are affective factors such as students' motivation, beliefs, and attitudes towards mathematics and its teaching, as these factors can have an impact on students' mathematical skills and their future mathematical learning (Vankus, P. 2021). Moreover, the effectiveness of game learning and investigated potential gender differences in game effectiveness in changing students' attitudes Mavridis, A., Katmada, A., & Tsiatsos, T. (2017).

According to Dr. Singh and Dr. Agarwal, their experimental study investigated whether computer games help in teaching Mathematics to students and whether computer games help equally both boys and girls in using computers in studying Mathematics. Singh, Y. P., & Agarwal, A. (2013). Using mathematical computer games for teaching contributes to more efficient and quicker realization of educational goals at all levels of education. (Divjak, B., & Tomić, D. (2011). Today's student-centered teaching methods to develop highly qualified learners, capable of learning in an active and collaborative environment, calls for the deployment of game-based activities and simulations that will enable them to face the challenges of the dawning era. Vlachopoulos, D., & Makri, A. (2017). According to one study, digital games (like video games or computer games) have been used as an effective educational method that can improve students' motivation and performance in mathematics education. Byun, J., & Joung, E. (2018). Using online games, it can examine the effects of teacher-delivered intervention with online mathematics mini-games on special education students' multiplicative reasoning ability. Bakker, M., van den Heuvel- Panhuizen, M., & Robitzsch, A. (2016). It entertains the elements

of mathematics lessons favoring increasing interest in the subject as well as the development of logical thinking. Sapoyevich, J. K. (2021).

Moreover, based on the study of White, Kyli and McCoy, Leah P. (2019) it reveals the attitudes indicating that incorporation of serious games was successful because the games “make math feel like it’s not math” and pushed many students “to work harder than [they] normally would because the work was fun and challenging.” The games were effective teaching and learning tools because they (a) were experiential in nature, (b) offered an alternative way of teaching and learning, (c) gave the students reasons to learn mathematics to solve the game problems and progress in the, (d) addressed students’ mathematics phobias and (e) increased time on task. As one of the teachers stated: “It [the games] makes them want to learn [math].” Also, they found out that the games were effective because they (a) combined learning and fun, (b) offered mathematics an adventurous and exploratory context, and (c) challenged students to learn mathematics. (Kebritchi, M., Hirumi, A., & Bai, H. (2010).

Furthermore, In the study of Ting, F., Lam, W., & Shroff, R. (2019) that previous studies support active learning and the integration of mobile learning technologies into mathematics course design as an active pedagogy to enhance student interaction and collaboration. Therefore, mathematics educators should implement innovative active learning techniques by using game-based learning technologies and use-to-use technologies to make learning, in the context of mathematics, more engaging, interactive, and collaborative.

However, these may not be possible if Teachers ’knowledge of the use of educational technologies are poor so that it should increase for them to know what dimensions of learning and domains of different materials are supported in order to achieve in-depth learning outcomes.

Studies also affect the domain of study. (Nygren, E., Blignaut, S., Leendertz, V., Sutinen, E., (2019)

METHODOLOGY

This study used a descriptive research design is conclusive, which is opposed to exploratory. This means that a descriptive research method attempts to collect quantifiable information for statistical analysis of the population sample through data analysis also, it attempts to explore and explain along with providing additional information about the topic. Therefore, this type of research aims to use close-ended questions to draw a concrete conclusion and to provide unique insights about the respondents.

However, use it properly so it can help an organization better define and measure the significance of the topic about the target audience and the population they represent. Descriptive research gives either a qualitative or quantitative, or both, description of the general characteristics of the group or case under study. Using this method, we can collect the data of each respondent when we observe or do a survey.

REFERENCES

Abramovich, S. (2010). *Topics in mathematics for elementary teachers: A technology-enhanced experiential approach*. Charlotte, NC: Information Age Publishing, Inc.

Bakker, M., van den Heuvel- Panhuizen, M., & Robitzsch, A. (2016). Effects of mathematics computer games on special education students' multiplicative reasoning ability. *British Journal of Educational Technology*, 47(4), 633-648.

Byun, J., & Joung, E. (2018). Digital game- based learning for K–12 mathematics education: A meta- analysis. *School Science and Mathematics*, 118(3-4), 113-126.

DeBell M, Chapman C (2006). *Computer and internet use by students in 2003*. Washington, DC: National Center for Education Statistics.

Divjak, B., & Tomić, D. (2011). The impact of game-based learning on the achievement of learning goals and motivation for learning mathematics-literature review. *Journal of Information and Organizational Sciences*, 35(1), 15-30.

Geer JP (2005). *Why are video games good for learning?*
www.academiccolab.org/resources/documents/MacArthur.pdf.

<https://www.voxco.com/blog/descriptive-research/>

<https://www.questionpro.com/blog/descriptive-research/>

Ke F (2008). *Computer Games Application Within Alternative Classroom Goal Structures: Cognitive, Metacognitive, and Affective Evaluation*. *Educ. Technol. Res. Devel.* (56): 539-556.

Kebritchi, M., Hirumi, A., & Bai, H. (2010). *The effects of modern mathematics computer games on mathematics achievement and class motivation*. *Computers & education*, 55(2), 427-443.

Mavridis, A., Katmada, A., & Tsiatsos, T. (2017). *Impact of online flexible games on students' attitude towards mathematics*. *Educational Technology Research and Development*, 65(6), 1451-1470.

Nygren, E., Blignaut, S., Leendertz, V., Sutinen, E., (2019) Quantitizing Affective Data as Project Evaluation on the Use of a Mathematics Mobile Game and Intelligent Tutoring System. *Vol. 18, 375 – 402*. <https://doi.org/10.15388/infedu.2019.18>

Oblinger DG (2006). *Games and learning*. *EDUCASE Quarterly*, 29(3):5-7.

Sapoyevich, J. K. (2021). Didactic games in teaching mathematics. *ACADEMICIA: An International Multidisciplinary Research Journal*, 11(3), 2545-2551.

Singh, Y. P., & Agarwal, A. (2013). Teaching mathematics to children with mental retardation using computer games. *Educationia Confab*, 2(1), 44-58.

Ting, F., Lam, W., & Shroff, R. (2019), *Active Learning via Problem – Based Collaborative Games in a Large Mathematics University Course in Hong Kong*. *Education Sciences*. Volume 9. 172. <https://doi.org/10.3390/educsci9030172>

Tokac U., Novak E., & Thompson C.G. (2019), *Effects of game- based learning on students' mathematics achievement: A meta- analysis. Journal of Computer Assisted Learning*.1–14.
<https://doi.org/10.1111/jcal.12347>

Vankus, P. Influence of Game-Based Learning in Mathematics Education on Students' Affective Domain: A Systematic Review. *Mathematics* 2021,9, 986 <https://doi.org/10.3390/math9090986>

Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education*, 14(1), 1-33.

White, Kyli and McCoy, Leah P. (2019) "Effects of Game-Based Learning on Attitude and Achievement in Elementary Mathematics," *Networks: An Online Journal for Teacher Research*: Vol. 21: Iss. 1. <https://doi.org/10.4148/2470-6353.1259>

