Effect Of Deltamath Towards Students Learning Outcome: A Study Case In South Tangerang

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Abstract. *The advance of technology has affected many aspects of people's lives. One field that also has been greatly affected by this advancement is Education. There are lots of online learning platforms that emerged in the past 2 decades. Khan Academy and IXL are two favourite examples of those platforms that are being used to help students learning Mathematics and Science. DeltaMath, although not as famous, is also of the platforms that are available and can be used to help students learning Mathematics. This study examined the impact of DeltaMath toward students' Mathematics learning outcomes. There are 56 samples in total that are divided into 2 group of 28 students. One group is the group of students who are introduced to and are using DeltaMath as supplementary resources in their learning and the other group consisted of students that didn't use the DeltaMath in their learning. Main findings show that: 1. The average score of the final exam of group who used DeltaMath is higher than the group of students that didn't use DeltaMath. 2. Students who solved more than 150 questions in DeltaMath performed better in the final exam than most students, their average is 7 points higher compared to the average of all students. 3. There is no significant difference between group that are using DeltaMath compared to group of students who didn't use DeltaMath. There are still few publications related to DeltaMath, unlike Khan Academy and IXL, thus, this study hopefully can contribute to the research of the impact of using DeltaMath.*

Keywords: DeltaMath, Online Learning Platforms, Mathematics Study, Technology Effect, Education.

INTRODUCTION

In the past 2 decades, education has undergone a significant transformation. Online learning platforms have become increasingly essential in providing a structured and comprehensive learning experience for students, especially during challenging times such as the COVID-19 pandemic (Jiang, 2021). These platforms have emerged as important tools in the modern learning ecosystem, serving to different needs students worldwide. The rapid growth of these platforms is caused by technological advancements, changing educational approaches, and the increasing demand for flexible and personalized learning experiences. Online learning platforms take advantages of the internet to provide access to a wide range of resources, ranging from interactive lessons and video tutorials, hundreds of questions bank to virtual classrooms and forums for collaboration. This technological integration not only facilitates access to quality education but also supports continuous learning beyond the traditional classroom setting.

Furthermore, the flexibility offered by these platforms addresses the varying learning paces and styles of students. With easier access to course materials, students can design their learning schedules to fit their individual needs, balancing education with their other activities.

This personalized approach could enhance student engagement and motivation, fostering a more effective learning experience. Positive interactions with the features of online learning platforms, accompanied with clear and user-friendly interfaces, can lead to increased satisfaction and better learning experiences for students. (Zhao, 2019). The effectiveness of these platforms is further amplified by their ability to utilize data analytics and artificial intelligence. By analyzing student performance data, these platforms can provide personalized feedback and recommendations, helping students identify their strengths and areas for improvement. This data-driven approach ensures that each student receives a customized learning experience that optimizes their educational outcomes.

On the other side, on teacher's side it's well known by teachers that teaching is a demanding job. People outside education might think that teachers spend most of their time teaching, but that's not the case. Teachers are responsible for many tasks that have little to do with classroom instruction. Lesson planning and creating content for teaching materials are two examples of various tasks that teachers do. Thanks to the advancement of technology, teachers now can choose and see other people lesson plans and contents related to the topics that they are teaching. Internet provides the vast array of instructional and teaching resources. Teachers can access an extensive library of digital content, including interactive lessons, video tutorials, quizzes, and practice questions, and collaborating with other people online. This wealth of resources helps teachers to increase and improve their traditional teaching materials with more engaging and diverse contents that target to different learning styles and needs. However, teachers need to teach the students as well how to fully use and take advantages of those resources. Otherwise, the learning outcome might not be satisfactory and there might be some hurdles during the learning session while students try to utilize those technology.

DeltaMath is one of the many online platforms that can be used to help enhancing student learning experiences. Zach Korzyk created DeltaMath in 2009 when he wrote a simple program on substituting values into the Quadratic Formula. Positive student response prompted him to kick into gear and create content for the rest of the school year. In its first full year as a functional site, DeltaMath was used by 100 teachers and 5,000 students. In the years to come, Zach worked nights, weekends, and summers adding content and features. He taught himself database management, web servers, and JavaScript. By 2019-2020, the site had grown to over 100,000 teacher-users and 4 million students. (DeltaMath, 2024). DeltaMath is a widely used online educational platform that focuses on helping students improve their math skills. It provides a variety of interactive math problems, exercises, and instructional videos that cater to different levels of mathematics education, from middle school to high school and beyond.

DeltaMath is particularly known for its practice problems that cover a wide range of topics, including algebra, geometry, trigonometry, calculus, and statistics. Beside DeltaMath, there are many other digital platforms that could help students in their learning. Making students' learning experience more engaging and more personalized are the aims of these online platforms. Another example of online platform that provide similar services to DeltaMath are IXL and Khan Academy. One of the research projects conducted by IXL was done by using randomized-control trial (RCT) in Grade 3-5 in four elementary schools in Holland Public Schools. The research shows that a) IXL Math students significantly outgained control students by more than 10 points in Renaissance Star Math assessment, b) measure of total program usage were significantly positively associated with mathematics achievement gains, after controlling for prior mathematics achievement and demographic, as in the main impact analysis, c) teachers generally held very positive overall perception of IXL Math, especially regarding professional development (Copeland, Cook, Grant, & Ross, 2023). Another study related to online platform that help enhancing students learning experience was done in Brazilian primary school. In this research, once a week, teachers would take their students to the school's computer lab and teach using the Khan Academy platform, instead of their standard math classes. The researcher finds positive effects of the program on measures of attitudes towards math, which were not translated to a positive average treatment effect on students' math proficiency (Ferman, Finamor, & Lima, 2019).

In this study, the teacher will try to find out whether there is any difference in learning outcome of students who are exposed and are using DeltaMath in their learning and student who are not exposed and are not using DeltaMath. This is another study in which the focus is on technology and its effect to education. As nowadays, there are many options for teachers to help conducting blended learning and asynchronous learning.

METHOD

The goal of this study was to find the impact around this popular new learning platform as a mean to better understand the tool's role in students' learning output. This study was a quasi-experimental design using post-test only control group design. This research is conducted by taking sample of 56 students of Grade 7 in Kharisma Bangsa Junior High School. The sample further divided into 2 group, group 1 consist of 28 students who used and introduced to DeltaMath, and group 2 consist of 28 students who are not using and are not introduced to DeltaMath. The study is conducted for 3 months during the first semester of this academic year 2023/2024. In the beginning, teacher introduced DeltaMath to group 1 students and ask them

to create an account in this platform. Students' school emails are being used but some students had some difficulties to use their school email, thus as temporary measures students used their personal email to register in DeltaMath. After having set up their email, teacher assigned exercise questions to DeltaMath that related to the topics being discussed in the classroom. During this session teachers introduce the features and advantages of DeltaMath, including interactive videos and questions' solution in case they got the wrong answer to a certain question repeatedly. Teachers tell students that the score in their DeltaMath will not be taken into consideration for the final report, but it will be used as extra resources for learning Mathematics. Teachers will regularly add new exercise question in DeltaMath that related to current topic. Furthermore, once in a month, teacher will ask students to solve DeltaMath during learning period for 10 to 15 minutes and observes students' activity during that session. After 3 months passed, teacher gathered the data from Delta Math to see how many questions and how active the students are in utilizing the platform and find the relation of usage of DeltaMath to their performance in final examination. To analyze the data, independent sample t-test is used. According to Jim Frost (Frost, 2021), Independent samples t-test is usually used to compare the means of precisely two groups. Typically, this test is performed to determine whether two population means are different. This procedure is an inferential statistical hypothesis test, meaning it uses samples to draw conclusions about populations. The independent samples t-test is also known as the two sample t test.

RESULT AND DISCUSSION

The data collected is analyzed by using independent sample t test. The data is then inputted to SPSS program and from the output the average of students who used DeltaMath is 74.55, almost 4 points higher than the average of students who didn't use DeltaMath, which is 70.63. The standard deviation of both group is around 15.41 and 17.23 for group that used DeltaMath and the group that didn't use DeltaMath, respectively. Meanwhile the standard error mean for group who used DeltaMath and group of students that didn't use DeltaMath are 2.19 and 3.26, respectively. Further analysis shown that the average score of students who solved more than 150 questions during this study conducted is quite satisfactory, their average score is 80. This average is around 7 points higher than the cumulative average of 56 students combined, which is 72.6. A study conducted in US, examined 2000 students and 70 teachers in elementary and secondary schools regarding their perceptions of math studies taught in KA. Even though this study is using Khan Academy, DeltaMath can have similar outcomes considering their content, especially in math for elementary and junior high school have lot of

similarities. That study (Murphy, Gallagher, Krumm, Mislevy, & Hafter, 2014) showed that a) high school students showed more involvement in their studies as a result of using KA, b) more than 70% reported satisfaction with KA and break from traditional frontal learning, c) the combination of contents was significant and immediate feedback and hints helped students overcome problems. Further study (Vidergor & Ben-Amram, 2020) also found that KA is effective in promoting personalization, independence and innovative teaching-learning process and the teacher's presence as mediating cognitive and emotional learning plays a key role in students learning. Similar outcomes also observed during this case study. Students are eager to have DeltaMath session even though it was done only once in a month. They choose which topic and questions they wanted to solve which enforce the personalization, independence and students' autonomy in learning. Students' collaboration can be seen during this session in which students asked help from their friend when they stuck. Meanwhile, another student would read the solutions provided by DeltaMath first to understand their mistake. Sometime students come to teacher for help and explanation in case they didn't quite understand the explanation provided by DeltaMath or their friends explanation. Furthermore, some students asked for extra questions because they took advantages of availability of DeltaMath even when they are not at school. From data collected, the highest number of solved questions is 671 questions in the past 3 months. This is shown that DeltaMath can be a useful tool to help students, especially high motivated students, to enrich their learning experience. Like mentioned before, Khan Academy has more similarities than differences to DeltaMath especially for elementary and junior high school content, at least from K4 to K7. Lastly, from the independent t-test, it's found that the p-value is 0.373 which is more than 0.05 threshold. Therefore, it can be concluded that there is no significant difference between students' performance in final exam for students who are using DeltaMath and students who are not using DeltaMath in their learning process.

CONCLUSION

Unlike Khan Academy and IXL, study case related to DeltaMath is still minimum. This online platform provides rich feature for both educators and students. DeltaMath provided report, self-grading, ease of use, ready solutions to the question set, and timely feedback. Another research conducted related to immediate feedback, one of the common features of DeltaMath, Khan Academy, and IXL have, (Attali, Laitusis, & Stone, 2016) mentioned that timely feedback is key to students maximizing their potential and learning within a classroom. In this study case, it can be seen that there is no significant differences in learning outcomes for students who are using DeltaMath and those who didn't. DeltaMath is pretty similar to

Khan Academy in a sense, but further exploration needs to be done to see how impactful this online learning platform in enhancing student learning experiences in Mathematics.

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