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Students' Perception of Educational Games in the Learning of Mathematics

Dedi Irawan
SMK Kesehatan Imelda, Rantauprapat, North Sumatera
Email: idede0602@gmail.com

Learning mathematics is always perceived as difficult by students and makes them feel bored, anxious and lazy to participate in classroom learning. This study aims to investigate students' perceptions of the use of educational games in mathematics learning. This aim is motivated by the phenomenon that games only have a negative influence and make students lazy to learn. This type of research is quantitative research with descriptive narrative. The instrument used is a questionnaire on students' perceptions, which consists of 3 indicators, namely reaction, response and evaluation. The sample in the study were 210 students of SMK Imelda Rantauprapat. The data analysis technique used was the Miles and Huberman model. The results showed that in the response indicator, 75% of the students agreed that teachers used educational games, in the response indicator, 83% of the students agreed that educational games made it easier for students to understand mathematics learning, and in the assessment indicator, 81% of the students agreed that educational games were able to make students enjoy learning mathematics. Using educational games makes learning mathematics easier and more fun.

Keywords: Educational games; Mathematics; Perception

INTRODUCTION

Video games are defined as any software that allows user interaction through gameplay. They can vary widely in complexity and style (Ayenigbara, 2017). They function as cultural phenomena, influencing social interactions and individual experiences, while also reflecting broader societal themes (Horban & Maletska, 2018). Since their introduction in the 1950s, video games have evolved tremendously to become one of the most popular forms of entertainment worldwide. Various technological innovations have enabled game developers to create increasingly realistic and engaging graphics and gameplay (Djaouti et al., 2011). In addition, the internet and networking technologies have also enabled players to play games online with other players from around the world (Akchelov & Galanina, 2016).

Video games are often viewed through a critical lens, associated with negative behaviours, but they also offer cognitive and educational benefits that challenge traditional perceptions (Peron et al., 2022). Especially for certain populations, such as veterans with mental health problems, video games can serve as a therapeutic tool (Barbara, 2022). Based on various studies and reports, here are some data related to video game addiction among children in Indonesia: (1) KPAI (Indonesian Child Protection Commission) found that in 2020, about 19.3% of children in Indonesia were addicted to online games. This addiction is considered quite alarming as it affects children's mental, physical and social health; (2) The 2018 survey of the Indonesian Association of Internet Service Providers (APJII) shows that around 58.8% of Indonesian children and adolescents aged 13-18 years use the internet mainly to play online games. However, this figure includes online game users, not those who are addicted.

The negative effects of gaming lead to a decline in students' academic performance, as students often prioritise gaming over their studies, leading to procrastination and neglect of assignments (Zameri et al., 2024). Excessive gaming can reduce students' interest in learning. This can lead to lower engagement and academic performance (Satrial et al., 2023). Research shows that frequent online gaming correlates with reduced motivation to learn, especially among younger students, as they become more involved in gaming than in educational activities (Waqi & Nisa, 2024). Online gaming can have a negative impact on social interactions, leading to behaviours such as the use of abusive language, lack of responsibility and reduced empathy towards others (Muminah et al., 2023). Students can also experience isolation and lack of social skills due to excessive gaming, which can hinder their ability to engage in real-life relationships (Zameri et al., 2024). While some studies point to the potential benefits of online gaming, such as improvements in cognitive skills and stress reduction, others, such as (Mofu & Rumthe, 2024).

The results of these studies suggest that gaming has a negative impact on students, both academically and socially. With the advancement of technology and the mindset of today's society, video games can be used in a positive way, especially in education, such as improving cognitive, artistic, language and social skills (Manggena et al., 2017). Research results Zendrato & Harefa, (2022) found that online games have a positive impact on students' learning. The game in question is an educational game that contains elements of education and learning (Jayanti et al., 2018). Educational games are a form of innovation in mobile games. Therefore, teachers need to innovate and adapt to the development and sophistication of technology by using learning media in the form of educational games that can be developed in mathematics learning to make mathematics fun to learn (Salsabila et al., 2020; Handican & Setyaningrum, 2021).

Learning mathematics is always perceived as difficult by students. This makes students feel bored, anxious and lazy to participate in classroom learning (Kholil & Zulfiani, 2020; Anditiasari, 2020). This perspective can discourage students from learning mathematics and can make them uninterested and unable to understand mathematical concepts. In fact, this perspective is wrong because learning mathematics can improve students' critical thinking skills (Cresswell & Speelman, 2020). Good mathematical skills can help students solve problems and make informed decisions. Educational games can help students to better understand mathematical concepts. If students have a positive view of educational games in learning mathematics, they will be more interested in learning. However, if students have a negative view of educational games, then students will not be motivated to learn mathematics. Therefore, the purpose of this study is to analyse students' perceptions of the benefits of educational games in learning mathematics.

METHODS

This research is a quantitative research that is narrated descriptively. This research was conducted in SMK Imelda Rantauprapat which had a total of 210 students. The instrument used in the study was a questionnaire that included 3 indicators of perception, namely, absorbing, understanding and evaluating. The data analysis technique is based on Miles and Huberman's model, namely (1) collecting data from different sources; (2) data reduction, which aims to simplify and organise the collected data so that it is easier to understand and analyse; (3) data presentation, by presenting the data visually or descriptively; (4) inference, by interpreting the presented data and drawing conclusions from the findings or patterns that emerge from the data.

RESULTS AND DISCUSSION

Pupils' perceptions of educational games in mathematics learning, which consists of 3 indicators, namely reactions (36%), answers (41%) and assessments (23%) (Figure 1). These results show that students understand what they have learned when teachers use educational games.

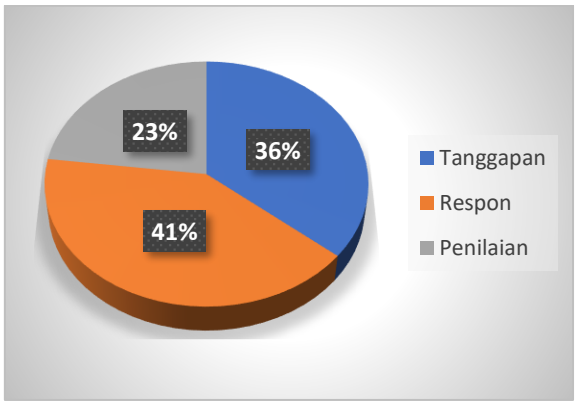

Figure 1. Students' perceptions of educational games

Based on the indicators of students' responses regarding educational games in mathematics learning, 83% of students agreed that educational games make it easier for students to understand mathematics material, 12% answered that they did not know and 5% answered that they disagreed (Figure 2).

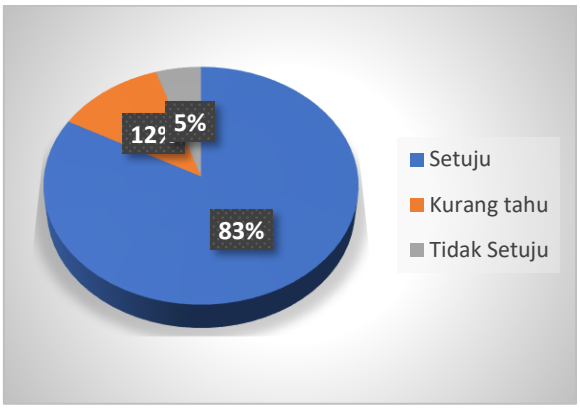

Figure 2. Indicator Students' responses to the educational game

In the response indicator, 75% of students answered that they liked the educational game, 17% of students answered that they did not know and 8% answered that they disagreed (Figure 3).

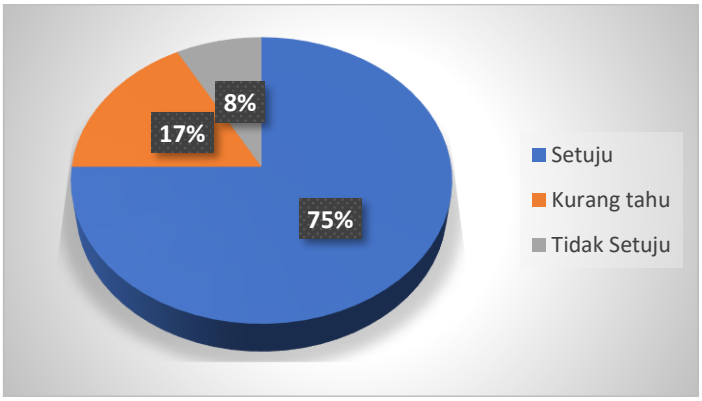

Figure 3. Student response to educational games indicators

In the evaluation indicator, 81% of the students answered that the educational game was easy to understand and use, 10% of the students did not know and 9% of the students disagreed (Figure 4).

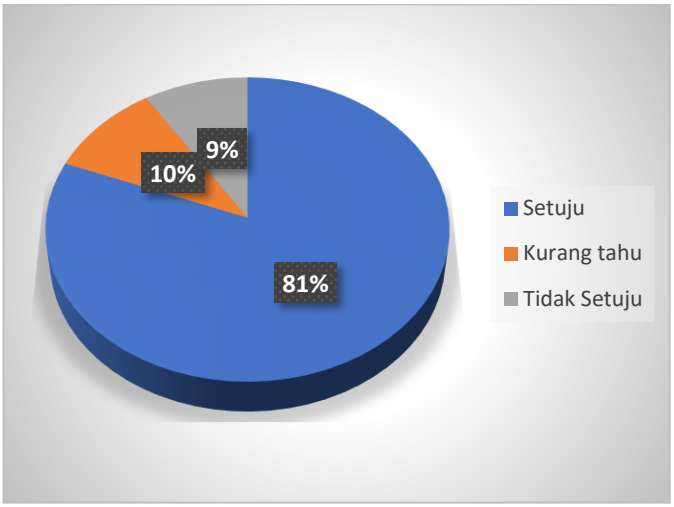

Figure 4. Indicators for evaluating educational games

Discussion

Students' perceptions of educational games in mathematics learning received mixed responses, but the majority of students agreed when teachers used educational games. The pre-survey of the students shows that the students' knowledge of the learning media used by teachers in the classroom is quite good. Teachers often use package books, LKPD and Microsoft Power Point. The use of concrete learning media significantly enhances students' learning experiences in different educational contexts. Research shows that concrete materials facilitate better conceptual understanding, engagement and retention of knowledge (Theodorus et al., 2022). In mathematics, concrete experiences help to bridge informal and formal knowledge. This allows students to extend their understanding effectively (Kejora, 2020).

The use of educational media affects students' learning outcomes, especially in mathematics, which is known to make students anxious, lazy and bored when the teacher uses only educational media. The use of educational games can overcome this problem. Research on the use of educational games in mathematics learning shows significant benefits in improving student engagement, understanding and performance. Several studies have shown that game-based learning can effectively address challenges in mathematics education, especially for students with diverse needs. Educational games, such as the game 'X-MATH', have been shown to significantly increase students' interest in mathematics, achieving validation scores of 95% for content and 91.6% for media effectiveness media (Septianing et al., 2024). The Fun Maths game specifically improved the arithmetic skills of children with dyscalculia, with pre- and post-test scores increasing from 47.43 to 72.57, indicating significant learning gains (Aliifah et al., 2024). Game-based edutainment media have been found to be highly practical in improving cognitive and affective performance in mathematics learning (Narciso et al., 2024). The use of games creates a more inclusive environment. It accommodates students with special needs and promotes a dynamic learning atmosphere. The use of games creates a more inclusive environment. It accommodates students with special needs and promotes a dynamic learning atmosphere (Ardani et al., 2024).

The results obtained in the response aspect showed that the majority of students agreed that educational games should be used by teachers when learning mathematics. The reason why the students answered this is because the learning media used by the teacher so far are very boring and there are also students who are afraid to participate in class when the teacher gives tasks. Educational games in mathematics improve learning efficiency, increase interest and improve problem solving skills. Students benefit from an immersive experience that supports the flexible application of mathematical concepts in a variety of situations (Weng & Ding, 2023). This educational game is expected to be a fun learning medium that can help increase children's interest in learning mathematics and help teachers as an alternative medium to deliver mathematics learning materials (Supriyono et al., 2022). Research Gandhi & Verma, (2022) reported that educational games can improve maths learning by making it more creative, relevant and fun. Students who enjoy games understand maths concepts more easily, leading to improved competence and lasting effects.

Pupils' perceptions on the response aspect revealed that 81% of pupils agreed that educational games are easy to use so that they can understand mathematics lessons more easily. Pupils stated that educational games are more fun and can increase enthusiasm to better understand the material explained by the teacher. Maths educational games are generally designed to be easy to use, especially for young learners (Polat et al., 2022). Research shows that these games can effectively engage students and enhance their learning experience. A study of PowerPoint-based maths games for children aged 5-6 years showed an average usability rating of 86% in a one-to-one evaluation, indicating that they are practical and easy to use (Rosalina, 2022). Educational games, such as those using the finite state machine method, have been shown to increase student motivation and understanding of mathematical concepts, making them effective learning tools (Dawson et al., 2023). While many educational games are designed to be easy to use, some research highlights areas for improvement, particularly in learning and retention, suggesting that continuous development is needed to increase their effectiveness (Enggar & Ajib, 2020).

In terms of student perceptions on the assessment indicator, 81% of students agreed that the educational game helped students to enjoy mathematics more. The evaluation of educational games in mathematics education showed a generally positive impact on student engagement and learning outcomes. Research shows that well-designed educational games can improve students' motivation, performance and attitudes towards mathematics. Educational games have been shown to significantly increase students' motivation and enjoyment during mathematics lessons, leading to more positive attitudes towards the subject (Sahin et al., 2022). Trainee teachers who developed educational games reported increased engagement and enjoyment in the learning process, highlighting the potential of games as effective teaching tools (Oflaz, 2023). Studies show that educational games can improve students' mathematical knowledge and skills, with some studies showing a correlation between performance in games and subsequent academic success (Norum et al., 2024). A mobile educational game developed for secondary school students showed measurable

improvements in student performance, suggesting that such games can effectively facilitate learning in mathematics (Fetaji et al., 2020).

The role of teachers in using educational games as a learning medium for students is very important. Students who previously did not understand the concept of mathematics and were afraid of learning mathematics became more enthusiastic and excited about learning. Educational games that are made do not have to use sophisticated technology, these educational games can be made using Power Point, make modifications from existing media and can also teach educational games that have been created by others

CONCLUSION

Learning mathematics, which is perceived as scary by students, can be overcome by using learning media in the form of educational games. Students' perceptions of educational games on the response indicator obtained 83% agree, 12% do not know and 5% disagree. On the response indicator, 75% agreed, 17% did not know and 8% disagreed. For the evaluation indicator, 81% agreed, 10% did not know and 9% disagreed. Using educational games makes learning mathematics easier and more fun.

REFERENCE

Akchelov, E., & Galanina, E. (2016). *Virtual World of Video Games*. 1–4. https://doi.org/10.1109/VS-GAMES.2016.7590379

Aliifah, H. N., Prakosha, D., & Gunarhadi. (2024). Effect of the Fun Mathematics Educational Game on the Arithmetic Operation Skills of Children with Dyscalculia. *Special and Inclusive Education Journal (SPECIAL)*, *5*(1), Article 1. https://doi.org/10.36456/special.vol5.no1.a9131

Anditiasari, N. (2020). Analisis Kesulitan Belajar Abk (Tuna Rungu) dalam Menyelesaikan Soal Cerita Matematika. *Mathline: Jurnal Matematika Dan Pendidikan Matematika*, *5*(2), Article 2. https://doi.org/10.31943/mathline.v5i2.162

Ardani, R. A., Suwarno, M., Rezky, R., & Utari, T. (2024). Game-based edutainment media: How practical is it as a medium for learning mathematics? *AIP Conference Proceedings*, *3046*(1), 65–78. https://doi.org/10.1063/5.0194544

Ayenigbara, I. O. (2017). Gaming Disorder and Effects of Gaming on Health: An Overview. *Journal of Addiction Medicine and Therapeutic Science*, *4*(1), 001–003.

Barbara, A. C. (2022). Video Games: A Complementary Therapy for Veterans with Serious Mental Illness. *Journal of Veterans Studies*, *8*(1), 83–86. https://doi.org/10.21061/jvs.v8i1.301

Cresswell, C., & Speelman, C. P. (2020). Does mathematics training lead to better logical thinking and reasoning? A cross-sectional assessment from students to professors. *PLoS ONE*, *15*(7). https://doi.org/10.1371/journal.pone.0236153

Dawson, J. G. M., Hibadullah, C. F., Matraf, M. S. B., Harun, N. H., Hashim, N. L., & Dahari, R. (2023). Jungle Math: An Educational Mobile Games for Preschoolers Learning Mathematics. *Emerging Advances in Integrated Technology*, *4*(2), Article 2.

Djaouti, D., Alvarez, J., Jessel, J.-P., & Rampnoux, O. (2011). Origins of Serious Games. In *Serious Games and Edutainment Applications* (pp. 25–43). https://doi.org/10.1007/978-1-4471-2161-9_3

Enggar, A. L., & Ajib, S. (2020). Mathematics Education Game Using the Finite State Machine Method to Implement Virtual Reality in Game Platformer. *Inform: Jurnal Ilmiah Bidang Teknologi Informasi dan Komunikasi*, *5*(1), 8–13. https://doi.org/10.25139/inform.v5i1.1860

Fetaji, M., Kajtazi, E., Fetaji, B., Snopce, H., & Apostolova, M. (2020). *Assessing the Impact of Mobile Educational Games on Student's Success within Mathematics Subject in Primary Schools*. 878–881. https://doi.org/10.23919/MIPRO48935.2020.9245150

Gandhi, S., & Verma, R. (2022). Review on various Edutainment techniques of Mathematics pedagogy. *Research Journal of Engineering and Technology*, *13*(4), 112–116. https://doi.org/10.52711/2321-581X.2022.00017

Handican, R., & Setyaningrum, W. (2021). Developing a Mobile Game Using Scientific Approach to Support Mathematics Learning. *Edumatika : Jurnal Riset Pendidikan Matematika*, *4*(1), Article 1. https://doi.org/10.32939/ejrpm.v4i1.607

Horban, O., & Maletska, M. (2018). Basic approaches to the definition of the concept of "videogame" as an element of modern scientific discourse. *Skhid*, *3(155)*, Article 3(155). https://doi.org/10.21847/1728-9343.2018.3(155).139675

Jayanti, W. E., Meilinda, E., & Fahriza, N. (2018). Game Edukasi "Kids Learning" Sebagai Media Pembelajaran Dasar Untuk Anak Usia Dini Berbasis Android. *Jurnal Khatulistiwa Informatika*, *6*(1), Article 1. https://doi.org/10.31294/jki.v6i1.3804

Kejora, M. T. B. (2020). The Use of Concrete Media in Science Learning in Inquiry to Improve Science Process Skills for Simple Machine subject. *MUDARRISA: Jurnal Kajian Pendidikan Islam*, *12*(1), Article 1. https://doi.org/10.18326/mdr.v12i1.1-17

Kholil, M., & Zulfiani, S. (2020). Faktor-Faktor Kesulitan Belajar Matematika Siswa Madrasah Ibtidaiyah Dawatul Falah Kecamatan Tegaldlimo Kabupaten Banyuwangi. *Educare*, *1*(2), 151–168. https://doi.org/10.35719/jpe.v1i2.14

Manggena, T. F., Putra, K. P., & Sanubari, T. P. E. (2017). Pengaruh Intensitas Bermain Game Terhadap Tingkat Kognitif (Kecerdasan Logika-Matematika) Usia 8-9 Tahun. *Satya Widya*, *33*(2), Article 2. https://doi.org/10.24246/j.sw.2017.v33.i2.p146-153

Mofu, B., & Rumthe, R. (2024). Dampak Game Online Dalam Meningkatkan Prestasi Siswa: TThe Impact of Online Games in Improving Student Achievement. *MURAI: Jurnal Papua Teologi Konstekstual*, *5*(1 Januari), Article 1 Januari. https://doi.org/10.58983/jmurai.v5i1.129

Muminah, A. F., Haryanto, B., & Astutik, A. P. (2023). The Influence of Online Games on The Social Behavior of High School Students. *Edumaspul: Jurnal Pendidikan*, *7*(1), Article 1. https://doi.org/10.33487/edumaspul.v7i1.6047

Narciso, R., Santos, A. de O., Machado, J. C., Rodrigues, J., Castilho, L. P. de, Gomes, L. C. M., Ribeiro, M. F. de A., & Tavares, S. M. (2024). The use of games and play activities in teaching mathematics to children. *Cuadernos de Educación y Desarrollo*, *16*(2), 331–342. https://doi.org/10.55905/cuadv16n2-023

Norum, R., Lee, J.-E., Ottmar, E., & Harrison, L. (2024). Student profiles based on in-game performance and help-seeking behaviours in an online mathematics game. *British Journal of Educational Technology*, *13*(1), 56–67. https://doi.org/10.1111/bjet.13463

Oflaz, G. (2023). Evaluation of Educational Games Prepared by Mathematics Teacher Candidates According to Game Design Key Model. *Educational Policy Analysis and Strategic Research*, *18*(1), 145–174. https://doi.org/10.29329/epasr.2023.525.7

Peron, D. M., Passos, L. P., Camargo, F. E. de, & Fornari, J. (2022). Videogames: Transcending addiction, violence and escapism. *Simpósio Brasileiro de Jogos e Entretenimento Digital (SBGames)*, 448–457. https://doi.org/10.5753/sbgames_estendido.2022.226088

Polat, E., Hopcan, S., Yildiz Durak, H., Tosunoğlu, E., Pekyürek, M. F., Yilmaz, Ö., & Çakır, O. (2022). A Maths Serious Game for Mobiles: A Study on Design and Development. In S. Papadakis & M. Kalogiannakis (Eds.), *STEM, Robotics, Mobile Apps in Early Childhood and Primary Education: Technology to Promote Teaching and Learning* (pp. 465–487). Springer Nature. https://doi.org/10.1007/978-981-19-0568-1_20

Rosalina, L. (2022). Development of Mathematics Educational Games Through PowerPoint for Early Childhood. *JOYCED: Journal of Early Childhood Education*, *2*(2), Article 2. https://doi.org/10.14421/joyced.2022.22-01

Sahin, H. B., Anagun, S. S., Sahin, H. B., & Anagun, S. S. (2022). *Educational Computer Games in Math Teaching: A Learning Culture* (educational-computer-games-in-math-teaching). IGI Global. https://doi.org/10.4018/978-1-6684-3710-0.ch029

Salsabila, U. H., Habiba, I. S., Amanah, I. L., Istiqomah, N. A., & Difany, S. (2020). Pemanfaatan Aplikasi Quizizz Sebagai Media Pembelajaran Ditengah Pandemi Pada Siswa SMA. *Jurnal Ilmiah Ilmu Terapan Universitas Jambi*, *4*(2), Article 2. https://doi.org/10.22437/jiituj.v4i2.11605

Satrial, A., Jaafar, A., Sari, W. W., & Yumna, Y. (2023). Exploring the Impact of Online Gaming on Students Academic Engagement. *Ahlussunnah: Journal of Islamic Education*, *2*(2), Article 2. https://doi.org/10.58485/jie.v2i2.208

Septianing, E. M., Fathoni, M. I. A., & Fitri, A. (2024). Development Of "X-Math" Game-Based Learning Media To Increase Student's Mathematics Learning Interest. *Aksioma: Jurnal Program Studi Pendidikan Matematika*, *13*(2), Article 2. https://doi.org/10.24127/ajpm.v13i2.8700

Supriyono, S., Gunawan, H., & Bachtiar, N. K. (2022). Penerapan Game Edukasi Sebagai Media Pembelajaran Matematika Untuk Anak Sekolah Dasar (Sd) Berbasis Android. *Inti Talafa*, *14*(2), Article 2. https://doi.org/10.32534/int.v14i2.3769

Theodorus, S., Wibowo, W., & Nurlaela, L. (2022). Learning concrete structures using IT-based interactive media. In *Innovation on Education and Social Sciences*. Routledge.

Waqi, A., & Nisa, S. (2024). Pengaruh Game Online terhadap Motivasi Belajar Siswa Sekolah Dasar. *Ahkam*, *3*(2), 567–574. https://doi.org/10.58578/ahkam.v3i2.3205

Weng, T.-S., & Ding, Z.-X. (2023). Using a Level-based RPG Educational Game to Enhance Students' Knowledge of Mathematics. *Tuijin Jishu/Journal of Propulsion Technology*, *44*(4), Article 4. https://doi.org/10.52783/tjjpt.v44.i4.2503

Zameri, N. I. H. M., Mahmud, M. I., & Johari, K. S. K. (2024). The Influence of Online Gaming Addiction on Students' Learning Performance. *International Journal of Academic Research in Business and Social Sciences*, *14*(6), 206–218. http://dx.doi.org/10.6007/IJARBSS/v14-i6/21779

Zendrato, Y., & Harefa, H. O. N. (2022). Dampak Game Online Terhadap Prestasi Belajar Siswa. *Educativo: Jurnal Pendidikan*, *1*(1), Article 1. https://doi.org/10.56248/educativo.v1i1.21