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Optimizing the Utilization of Game-Based Learning Application for Elementary Students First Phase

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Abstract

Smartphone was a technology-based device that was almost used and owned by every individual, both teachers and students. This study aimed to identify opportunities for using smartphones to support learning activities. This type of research was included in qualitative research, the research subject consists of 30 students of primary education level who were randomly selected. The data collection method used was a survey with a research instrument, namely a questionnaire. Through the questionnaire, it was found that 86.7% of students have smartphones that are used to play games (76.7%), using smartphones in a day for more than 5 hours (63.3%) this was certainly an opportunity for innovative learning media to emerge. with a game format (game-based learning). Referring to the results, it could be concluded that the innovation of learning media with game-based learning has a very big opportunity to be used by teachers to support the learning process.

Keywords: *smartphone; learning; math; android; game.*

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Introduction

Distance learning has caused Learning Loss, namely a decrease in learning achievement, as well as Literacy Loss, namely the loss of literacy skills, both for early grade and high grade students in elementary school (Nikou & Maslov, 2021; Schneider & Council, 2021). The learning program from home or abbreviated as BDR through the network has not been able to target the competencies that students should acquire (Sari, 2020; Revilda et al., 2021). Referring to several international studies, ideally students will experience an increase in literacy and numeracy competencies during learning through the network (Oktaviyanthi & Agus, 2019). OECD data in 2018 shows that Indonesia's literacy and numeracy score is only 379 with an OECD average score of 487. This shows that the numeracy literacy ability of students in Indonesia is still low. In fact, the OECD's statement in 2020 shows a decline in the number of literacy and numeracy abilities in Indonesia based on their quick test survey (OECD, 2019).

The implementation of distance learning through networks causes a decrease in the quality of the learning process both in terms of the process and results (Kusmaryono et al., 2021). This situation can occur because Indonesia is not yet familiar with online learning models, both teachers and students. Students in schools that apply online learning should have a much better level of numeracy literacy than participants in schools that study conventionally (Shabrina, 2022). This can happen because participants in schools that apply

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online learning must be able to practice self-study to read through individually and then apply what is obtained to find solutions to problems during learning (Putikadyanto et al., 2021; Erol & Danyal, 2020).

Numerical literacy competence is defined as the ability of students to describe information related to numbers or mathematics then formulate a problem, analyze the problem, and find a solution to the problem (Faridah et al., 2022; Sikora et al., 2019). Numerical literacy competence is very necessary in mathematics, because mathematics is not only related to formulas, but also requires students' reasoning power or critical thinking patterns in answering each of the problems presented (Faridah et al., 2022; Sikora et al., 2019; Puspaningtyas & Ulfa, 2021). Numerical literacy can also help students understand the role of mathematics in solving problems in real life.

There are three main challenges in online learning during a pandemic (Rasmitadila et al., 2020; Aini et al., 2020; Qureshi et al., 2012; Grynyuk et al., 2022) including; 1) As students, they must be able to learn independently so that the problem of self-regulation and consistency in studying material outside of class hours is a challenge for students, 2) As a teacher, you must prepare and change the delivery of material that originally used printed material, switch to digital material. This then becomes a challenge for teachers so that students still get the full subject matter, 3) in terms of institutions or schools, schools must prepare facilitation so that online learning can run, this is of course not only related to technical equipment such as internet networks and digital devices, but schools also need to shift their financial allocations. As it is known that teachers have limited time in preparing and adapting offline learning materials to online. Furthermore, the lack or limited opportunities for teachers and students to interact directly and freely during online learning which results in disruption of the learning process, as well as the use of an effective pedagogic approach requires more effort in motivating and activating students in online learning (Perets et al., 2020; Riyatuljannah & Fatonah, 2021; Elberkawi et al., 2020).

Field facts showed that during online learning, MI (Madrasah Ibditidaiyah) class students, especially the lower class, have very low numeracy literacy. This is evidenced from the results of interviews and data on the daily scores of several teachers in one of the lower MI classes, namely grades 1, 2 and 3 and it is found that the lowest score is in grade 1. This is because the teacher experiences several obstacles and difficulties during the learning process. For example, it is difficult to find media that is suitable for online learning, teachers lack mastery of technology-appropriate learning strategies and teachers only use the WhatsApp application. So that a solution is needed to overcome these problems, an appropriate learning media is needed so that it can increase the numeracy literacy competence of the class I MI students.

The presence of learning media will basically really help teachers and students in optimizing the teaching and learning process. Learning media can be used to improve students' understanding of the concepts of the material they are learning (Nur Jannah, 2020; Roemintoyo & Budiarto, 2021). This can be achieved if teachers use appropriate learning media and according to the needs of students in learning (Budiarto et al., 2021; Saputri et al., 2018). Learning media are not just physical objects, but everything that already contains learning material, thus allowing someone to use them to learn to gain knowledge, skills, or change attitudes (Yuliasri et al., 2021; Zou et al., 2021; Sholihah et al., 2020; Waminton & Erlinawaty, 2015). The role of learning media in the learning and teaching process is very important for educators today, because the role of learning media can be used to channel the sender's message to the recipient and through learning media can also help students to explain something conveyed by educators (Stošić, 2015; Arsić & Milovanović, 2016). With the use of these tools, teachers and students can communicate more steadily and lively and the interactions are multi-directional, besides that the learning media basically contains messages as learning stimulants and can foster learning motivation so that students do not become bored in achieving learning goals. .

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One of the digital-based media that is relevant to the development of technology and information is Game Based Learning. Video games designed for the learning process can create virtual worlds where players complete simulations of real-world problems (Karakoç et al., 2022; Andrea & Nurhuda, 2020). Broadly speaking, there are two unique roles of video games that can be used as an effective learning tool, as a motivator and a simulator. Game as a motivator, namely video games with various advantages it has can make someone more interested and enthusiastic in facing the learning process (Qohar et al., 2021; Al Fatta et al., 2018). Meanwhile, as a simulator, video games can facilitate various things that are difficult to model, do, or simulate in the real world. Equipped with these facilities, we can do various experiments in the game and then apply it to our daily life. Game Based Learning as a learning medium so that game-based learning becomes more effective (Stančin et al., 2020; Puritat, 2019). The designer in this case the teacher as an educator, or instructor needs to create learning tasks that are integrated directly into the game. This means that results and processes need to be harmonized.

There are various studies that show that Game Based Learning is effective in the learning process. Chang Ching-Yi and Gwo-Jen Hwang conducted research related to the development of game based learning from 2007 to 2016 in various sample countries. The results of this study indicate that the use of game-based learning shows a positive significance in line with increasingly advanced technological developments and increasing teacher digital literacy (Chang & Hwang, 2019). In addition, game based learning shows an increase in student participation in the learning process because of the learning game (Anastasiadis et al., 2018). Game based learning also plays a role in increasing several literacy levels, both mathematical literacy, digital literacy and numeracy for elementary school students and shows the positive influence of media on the ability or achievement of these competencies (Chan et al., 2021; Greipl et al., 2020; Niemi et al., 2018). Thus, it can be concluded that there is a positive correlation between game-based learning, both for increasing learning participation and for increasing students' numeracy literacy skills.

The presence of smartphones in order to provide convenience and support learning activities can be applied in the form of innovative and communicative learning media such as Mobile Game-Based Learning or known as MGBL (Criollo-C et al., 2021; Greipl et al., 2020). The use of Mobile Game-Based Learning (MGBL) as a learning medium will be able to create a dynamic, adaptive, collaborative, competitive, and receiving learning process that is directly integrated into the game program (Sulistio & Qohar, 2020; Abdul Jabbar & Felicia, 2015; Troussas et al., 2020). All design elements in Mobile Game-Based Learning basically contain theoretical concepts regarding constructivism and cognitivism theory (Warsita, 2018; Mahdum et al., 2019). Therefore, this type of learning media will indirectly be able to provide learning that encourages social interaction, increases student motivation and engagement, and provides opportunities to develop skills needed in the 21st century such as collaboration, numeracy literacy, digital literacy, communication, and critical thinking (Notanubun, 2019; Sulaiman & Ismail, 2020; Fitriani et al., 2019).

In an effort to bring innovation in the form of learning media, it appears that teachers are constrained by various factors, both in terms of competence, time and administrative tasks inherent in themselves. This research will have differences from several similar studies that have been carried out, this research will focus on identifying the implementation of learning that utilizes smartphones and the need for the type or format of learning media that suits the needs and characteristics of students. This research also focused on efforts to obtain data on the needs analysis of the learning media innovations that are needed and in accordance with the characteristics inherent in students.

Referring to the description and some facts of research results which showed that the presence of ICT-based learning media innovations that can support the learning process was very important. Smartphone optimization could be a very significant and positive innovation, hopefully it would be bring an impact on the achievement of students' academic

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competencies, as well as the achievement of students' non-academic achievements. This study will aim to explore and identify the use of learning media by teachers and how students use their smartphones in daily activities.

Method

The type of research used was included in qualitative descriptive research (Patel & Patel, 2019), it was hoped that through this type of research it can describe how much opportunity there was to use games as learning media in the digital era to facilitate learning. The research sample consisted of 30 elementary education students first phase (Madrasah Ibtidaiyah), the research sample was selected randomly (Salim, 2019).

The data collection method used was a survey, with the data collection instrument was a questionnaire. The questionnaire instrument was adopted from research that has been carried out by (Qodr et al., 2021; Hanif et al., 2018). Before being distributed, this research questionnaire was consulted with the supervisor who are experts in the field of learning media, Education technology and have a Masters or Doctoral degree, Thereupon, it had go through the validation and given input, as a form of validation of expert judgment (Mohamad et al., 2015).

The analysis of the research results will be carried out in the form of data that is described with percentages and will be displayed in the form of tables and graphs (Ivanovich, 2014) thus, it will be easy to read the results and find out how big the opportunities for using games are to be used as learning media choices.

Meanwhile, this research procedure begins when a questionnaire that has been validated by two expert, and then distributed to students. This questionnaire contained questions that will be answered by students, where the contents of the questions aimed to identify the use of learning media, ownership of smartphones or computers as ICT tools to support learning, duration of smartphone use, and student use of smartphones. The research procedure is illustrated in the figure 1.

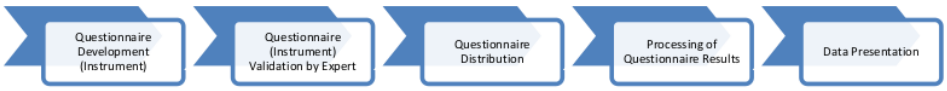

Figure 1. Research Flow

Result and Discussions

This research was conducted at the elementary education level first phase, namely Madrasah Ibtidaiyah which was followed by a research sample of 30 students. The results of student responses to several questions contained in the questionnaire will be described below. First, starting from students' opinions about the use of learning media used by teachers when delivering mathematics material. Reading books (57%) containing material dominate the use of learning media in the classroom, this is because material books are a printed learning resource that students can take to their homes and become one of the learning resources owned by the school. Followed by the type of video media (17%), because the teacher quite often shows various shows about mathematics learning material when explaining the material, even though the video is still shown in study groups, where the video media is shown in front of the class to be studied together - same. Meanwhile, the next type of media is presentation slides (27%), this result shows that teachers have also brought material in slide presentation format to be used as learning media. Next is the type of learning media with a multimedia format that seems to have never been used by the teacher when delivering the subject matter. The following is an analysis of student response data which is depicted in graphical form that can be seen in figure 2.

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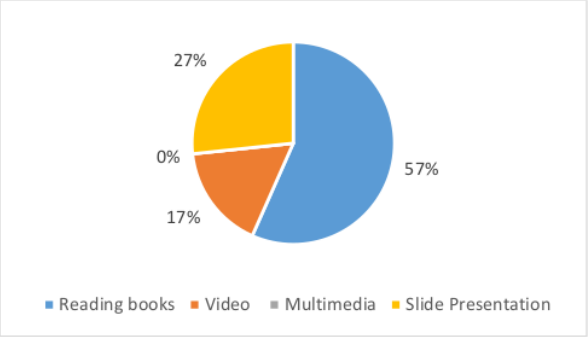

Figure 2. Student Responses Regarding Types of Learning Media

The next data will explain the students' responses regarding the types of ICT devices they have, but in this question it is limited to two answer choices, namely ownership of smartphones and or ownership of computer devices. A total of 26 students or 86.7% of students at this basic education level already have a smartphone, and the rest or a total of 13.3% answered that they have a computer in their home. Most of these students spend more time with smartphones than socializing activities with their environment. The results of students' responses to this second question will be illustrated in the figure 3.

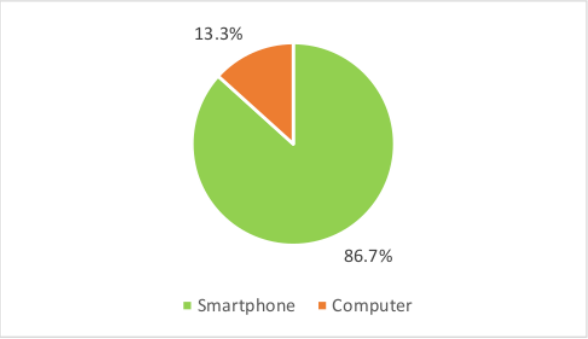

Figure 3. Types of ICT Devices Owned by Students

The next identification result is regarding the time or duration of using ICT devices, especially smartphones. The duration of this use will bring up a topic of discussion about how big the opportunities for using smartphones for learning activities are. The results of student responses show that most students use smartphones >5 hours per day (63.3%), and students only use about 1-3 hours per day, which is a total of (36.7%) students. From this field fact, it can be seen that there is great potential for smartphones to be later used to master and study subject matter, rather than being used for entertainment purposes or other non-educational activities. As the results of this response can be seen in figure 4.

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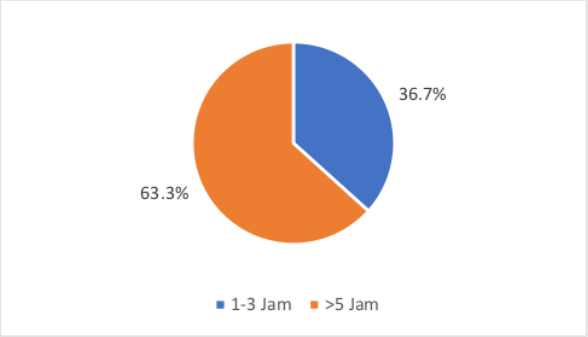

Figure 4. Duration of Smartphone Use by Students

The next illustration depicted in Figure 4 is about student responses to the questions contained in the questionnaire, about how far students have used smartphones. From the student responses, it was identified that, almost some students use smartphones to play games, which is 76.7%. In addition to playing games, some students also stated that they used their smartphones to watch videos (youtube access) which was 16.7%, and 6.7% of students stated that they use their smartphones to read digital books. From the results of student responses, it can be seen that teachers have not been able to facilitate the learning process that utilizes ICT, especially smartphones which apparently almost all students have, so it is very visible if students tend to use their smartphones for entertainment purposes.

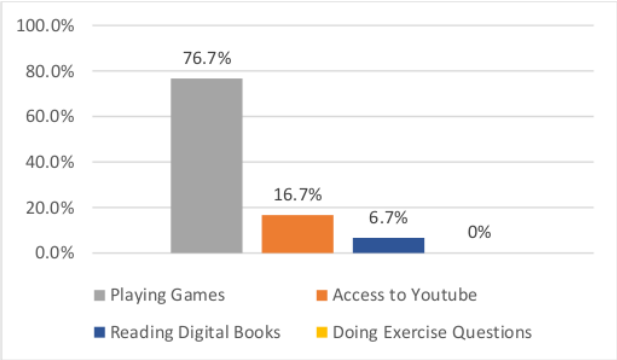

Figure 5. Use of Smartphones by Students

Through the results of student responses described in the previous section, it can be seen that smartphones basically have a very large opportunity to be used and optimized to support the learning process, especially learning mathematics at the elementary education level, because students really need supplementary material according to their characteristics. Smartphones are considered to have a great opportunity because of their function as ICT-based devices, where currently the integration of ICT devices such as smartphones is known as mobile based learning (Hanif et al., 2018; Abdul Talib et al., 2019; Som, 2021).

One of the operating systems attached to smartphones and very dominating in Indonesia is Android, and it is a technology device that is always used in various sectors of human life (Rosidah et al., 2021; Harris et al., 2020). Based on student responses, it showed that smartphones have a very big opportunity to support learning activities, through integration between learning media in games in particular, this is because the majority of smartphone use by students is used to play games (76.7%), so from interest in playing games

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can be diverted towards more useful activities, even though they both play games (Al Fatta et al., 2018; Wardoyo et al., 2021). This student response certainly cannot be separated from the characteristics of cognitive development according their social, psychology stage (Hatip & Setiawan, 2021), some research also shows that many school students who are in elementary school like games (Edmonds & Smith, 2017; Anastasiadis et al., 2018), which makes teachers then try to innovate by integrating the use of smartphones into learning activities (Nisa et al., 2020 ;Sinaga et al., 2019), they even specifically deliver material through game activities and media with game formats (Sulistio & Qohar, 2020; Agustini et al., 2020; Partovi & Razavi, 2019).

In addition, the response results also showrf that students are very familiar with smartphones, it can be seen from student responses which showed that 86.7% of students already have smartphones. The smartphone as an ICT device that is affordable, easy to monitor its use and has high flexibility has made the use of smartphones in the learning process very open (Liu et al., 2020; Chiappe-Laverde & Paz-Balanta, 2021). This is certainly good news for the continuity of learning activities, because smartphone ownership can have a positive impact on student academic achievement when used to support the learning process. Considering that several studies have also succeeded in proving that through the use of smartphones during learning activities, they contribute to learning achievement, motivation, character building, and even mastery of 21st century skills (Ardiansyah et al., 2020; Matzavela & Alepis, 2021; Zaheer et al., 2018; Hapsari et al., 2019; Criollo-C et al., 2021).

An integration of smartphones into the learning process is known as mobile learning, through mobile learning will be able to have a positive impact on the learning process, such as making it easier for students to learn, increasing learning motivation and increasing student achievement (Chiappe-Laverde & Paz-Balanta, 2021; Hafeez, 2021; Aurum & Surjono, 2021). In addition, empirically mobile learning according to several researches has also been proven to be able to facilitate students in mastering various subject matter and mastery of the competencies needed in the 21st century, such as innovativeness, communication skills, numeracy literacy, digital literacy, and communication skills. critical thinking (Saikat et al., 2021; Criollo-C et al., 2021; Halili, 2019; Suryanti & Wijayanti, 2018). However, students' awareness of using smartphones to support mastery of subject matter tends to be low, it is hoped that through the results of this identification and analysis of empirical facts regarding the use of mobile learning, it can be the first step for the emergence of further innovations regarding the use of smartphones for learning activities.

One form of innovation in using smartphones in the learning process can be realized by using a game-based learning application format or Mobile Game-Based Learning (MGBL). MGBL emerged since the student responses still like to play games on their smartphones (76.7%). The use of game-based learning media in learning in several research results has shown its success in increasing students' understanding and learning motivation (Su et al., 2022; Krisbiantoro Dwi, 2017). Game-based learning applications can encourage students to be more focused and maximize the use of smartphones as a fun learning medium, because students feel they are only playing a game instead of reading the material in full, it is one of the advantages of mobile game-based learning when used for the learning process (Tsai et al., 2016; Hu, 2020; Puritat, 2019). It can be seen from several researches on the use of games as learning media, such as games for mastering language vocabulary, games to increase motivation, to games to shape students' character (Partovi & Razavi, 2019; Irmansyah et al., 2020; Surahman, 2019), as well as research results. which overall shows that the use of mobile learning, especially game-based ones, has a positive impact on various student learning processes and outcomes (Wardoyo et al., 2021; Hussein et al., 2019; Pilegard & Mayer, 2016; Edmonds & Smith, 2017).

In the current digital era, technological advances in various sectors need to be balanced with ICT-based utilization innovations, especially in the field of education. ICT-based media innovation is basically needed in order to prepare superior and competitive

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human resources. Many studies show that Android-based mobile game based learning has a positive impact on helping students achieve various competencies. Therefore, the results of this study should be used as the first step in building an innovative learning media to support and facilitate student learning activities. In addition, the results of this study also show how big the potential for the use of mobile game-based learning is, which cannot be separated from the many empirical and theoretical facts that have proven that these devices are able to have a significant impact and contribution in achieving achievement and mastery of competencies needed by students.

Although this research is only limited to a needs analysis that tries to explore the use of smartphones during the learning process, it is hoped that other researchers and institutions who are interested in continuing research to the next stage, can use the results of this research as the basis for developing mobile game based learning products as one of the innovation to create a dynamic, interactive and fun learning environment.

Conclusion

The opportunity for using Smartphones is very large to support learning activities, this is of course based on the results of research that has been carried out. Likewise, the opportunity to utilize the potential of game-based mobile learning can be an effort to optimize the ICT-based learning process, so that the main competencies and supporting competencies can be achieved. This research can be useful for teachers to provide views related to smartphone optimization. Other researchers can try to develop learning applications with mobile game-based learning formats in mathematics subjects in order to measure their effectiveness on students' numeracy literacy skills.

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References

Abdul Jabbar, A. I., & Felicia, P. (2015). Gameplay Engagement and Learning in Game-Based Learning: A Systematic Review. In *Review of Educational Research* (pp. 740–779). https://doi.org/10.3102/0034654315577210

Abdul Talib, C., Aliyu, H., Abdul Malik, A. M., Hooi Siang, K., Novopashenny, I., & Ali, M. (2019). Sakai: A Mobile Learning Platform. *International Journal of Interactive Mobile Technologies (IJIM)*, *13*(11), 95. https://doi.org/10.3991/ijim.v13i11.10800

Agustini, M., Yufiarti, & Wuryani. (2020). Development of learning media based on android games for children with attention deficit hyperactivity disorder. *International Journal of Interactive Mobile Technologies*, *14*(6). https://doi.org/10.3991/IJIM.V14I06.13401

Aini, Q., Budiarto, M., Putra, P. O. H., & Rahardja, U. (2020). Exploring E-learning Challenges During the Global COVID-19 Pandemic: A Review. *Jurnal Sistem Informasi*, *16*(2), 57–65. https://doi.org/10.21609/jsi.v16i2.1011

Al Fatta, H., Maksom, Z., & Zakaria, M. H. (2018). Game-based learning and gamification: Searching for definitions. *International Journal of Simulation: Systems, Science and Technology*, *19*(6), 41.1-41.5. https://doi.org/10.5013/IJSSST.a.19.06.41

Anastasiadis, T., Lampropoulos, G., & Siakas, K. (2018). Digital Game-based Learning and Serious Games in Education. *International Journal of Advances in Scientific Research and Engineering*, *4*(12), 139–144. https://doi.org/10.31695/ijasre.2018.33016

Andrea, R., & Nurhuda, A. (2020). Developing Edu-Game "Ulun Smart-Kid" Learning Media of Banjar Language and Game Agent with Finite State Machine Model. *International Journal of Education and Management Engineering*, *10*(6), 10–16. https://doi.org/10.5815/ijeme.2020.05.02

Ardiansyah, R., Diella, D., & Suhendi, H. Y. (2020). Pelatihan Pengembangan Perangkat

DOI: 10.31004/obsesi.v6i6.2022

Pembelajaran Abad 21 Dengan Model Pembelajaran Project Based Learning Berbasis STEM Bagi Guru IPA. *Publikasi Pendidikan*, *10*(1), 31. https://doi.org/10.26858/publikan.v10i1.12172

Arsić, Z., & Milovanović, B. (2016). Importance of computer technology in realization of cultural and educational tasks of preschool institutions. *International Journal of Cognitive Research in Science, Engineering and Education*, *4*(1), 9–16. https://doi.org/10.5937/IJCRSEE1601009A

Aurum, E. V., & Surjono, H. D. (2021). The Development of Mobile Base Interactive Learning Multimedia For Critical Thinking Improvement. *Journal of Educational Science and Technology*, *7*(2), 174–187. https://doi.org/https://doi.org/10.26858/est.v0i0.15265

Budiarto, M. K., Rejekiningsih, T., & Sudiyanto, S. (2021). Students' opinions on the need for interactive multimedia development for entrepreneurship learning. *International Journal of Evaluation and Research in Education (IJERE)*, *10*(4), 1290–1297. https://doi.org/http://doi.org/10.11591/ijere.v10i4.21411

Chan, K., Wan, K., & King, V. (2021). Performance Over Enjoyment? Effect of Game-Based Learning on Learning Outcome and Flow Experience. *Frontiers in Education*, *6*(660376), 1–10. https://doi.org/10.3389/feduc.2021.660376

Chang, C. Y., & Hwang, G. J. (2019). Trends in digital game-based learning in the mobile era: A systematic review of journal publications from 2007 to 2016. *International Journal of Mobile Learning and Organisation*, *13*(1), 68–90. https://doi.org/10.1504/IJMLO.2019.096468

Chiappe-Laverde, A., & Paz-Balanta, G. A. (2021). M-learning: Connecting teaching and learning inside and outside of school. *Magis*, *14*, 1–24. https://doi.org/10.11144/JAVERIANA.M14.MLCT

Criollo-C, S., Guerrero-Arias, A., Jaramillo-Alcázar, Á., & Luján-Mora, S. (2021). Mobile learning technologies for education: Benefits and pending issues. *Applied Sciences (Switzerland)*, *11*(9). https://doi.org/10.3390/app11094111

Edmonds, R., & Smith, S. (2017). From playing to designing: Enhancing educational experiences with location-based mobile learning games. *Australasian Journal of Educational Technology*, *33*(6), 41–53. https://doi.org/10.14742/ajet.3583

Elberkawi, E. K., Ateeyah, M. A., Elakeili, S. M., & Maatuk, A. M. (2020). Issues and challenges of implementing E-learning in a public university: Students and instructors perspective. *ACM International Conference Proceeding Series*. https://doi.org/10.1145/3410352.3410826

Erol, K., & Danyal, T. (2020). Analysis of distance education activities conducted during COVID-19 pandemic. *Educational Research and Reviews*, *15*(9), 536–543. https://doi.org/10.5897/ERR2020.4033

Faridah, N. R., Afifah, E. N., & Lailiyah, S. (2022). Efektivitas Model Pembelajaran Project Based Learning Terhadap Kemampuan Literasi Numerasi dan Literasi Digital Peserta Didik Madrasah Ibtidaiyah. *Jurnal Basicedu*, *6*(1), 709–716. https://doi.org/10.31004/basicedu.v6i1.2030

Fitriani, H., Asy'ari, M., Zubaidah, S., & Mahanal, S. (2019). Exploring the prospective teachers' critical thinking and critical analysis skills. *Jurnal Pendidikan IPA Indonesia*, *8*(3), 379–390. https://doi.org/10.15294/jpii.v8i3.19434

Greipl, S., Moeller, K., & Ninaus, M. (2020). Potential and limits of game-based learning. *International Journal of Technology Enhanced Learning*, *12*(4), 363. https://doi.org/10.1504/IJTEL.2020.110047

Grynyuk, S., Kovtun, O., Sultanova, L., Zheludenko, M., Zasluzhena, A., & Zaytseva, I. (2022). Distance Learning During the COVID-19 Pandemic: The Experience of Ukraine's Higher Education System. *Electronic Journal of E-Learning*, *20*(3), 242–256. https://doi.org/10.34190/ejel.20.3.2198

Hafeez, M. (2021). Systematic Review on Modern Learning Approaches, Critical Thinking

DOI: 10.31004/obsesi.v6i6.2022

Skills and Students Learning Outcomes. *Indonesian Journal Of Educational Research and Review*, *4*(1), 167. https://doi.org/10.23887/ijerr.v4i1.33192

Halili, S. H. (2019). Technological Advancements in Education 4.0. *The Online Journal of Distance Education and E-Learning*, *7*(1), 63–69. https://tojdel.net/journals/tojdel/articles/v07i01/v07i01-08.pdf

Hanif, M., Asrowi, A., & Sunardi, S. (2018). Students' Access to and Perception of Using Mobile Technologies in the Classroom: the Potential and Challenges of Implementing Mobile Learning. *Journal of Education and Learning (EduLearn)*, *12*(4), 644–650. https://doi.org/10.11591/edulearn.v12i4.8398

Hapsari, A. S., Hanif, M., Gunarhadi, & Roemintoyo. (2019). Motion graphic animation videos to improve the learning outcomes of elementary school students. *European Journal of Educational Research*, *8*(4), 1245–1255. https://doi.org/10.12973/eu-jer.8.4.1245

Harris, B., Regan, T., Schueler, J., & Fields, S. A. (2020). Problematic Mobile Phone and Smartphone Use Scales: A Systematic Review. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.00672

Hatip, A., & Setiawan, W. (2021). Teori kognitif bruner dalam pembelajaran matematika. *PHI: Jurnal Pendidikan Matematika*, *5*(2), 87. https://doi.org/10.33087/phi.v5i2.141

Hu, J. (2020). Gamification in Learning and Education: Enjoy Learning Like Gaming. *British Journal of Educational Studies*, *68*(2), 265–267. https://doi.org/10.1080/00071005.2019.1682276

Hussein, M. H., Ow, S. H., Cheong, L. S., Thong, M. K., & Ale Ebrahim, N. (2019). Effects of Digital Game-Based Learning on Elementary Science Learning: A Systematic Review. *IEEE Access*, *7*, 62465–62478. https://doi.org/10.1109/ACCESS.2019.2916324

Irmansyah, J., Lumintuarso, R., Sugiyanto, F. X., & Sukoco, P. (2020). Children's social skills through traditional sport games in primary schools. *Cakrawala Pendidikan*, *39*(1), 39–53. https://doi.org/10.21831/cp.v39i1.28210

Ivanovich, A. (2014). Teknik Pengumpulan dan Analisis Data Kualitatif. *Jurnal Studi Komunikasi Dan Media*.

Karakoç, B., Eryılmaz, K., Turan Özpolat, E., & Yıldırım, İ. (2022). The Effect of Game-Based Learning on Student Achievement: A Meta-Analysis Study. *Technology, Knowledge and Learning*, *27*(1), 207–222. https://doi.org/10.1007/s10758-020-09471-5

Krisbiantoro Dwi, H. D. (2017). Game Matematika Sebagai Upaya Peningkatan Pemahaman Matematika Siswa Sekolah Dasar. *Jurnal Telematika*, *10*(2), 255–256.

Kusmaryono, I., Jupriyanto, J., & Kusumaningsih, W. (2021). A Systematic Literature Review on the Effectiveness of Distance Learning: Problems, Opportunities, Challenges, and Predictions. *International Journal of Education*, *14*(1), 62–69. https://doi.org/10.17509/ije.v14i1.29191

Liu, Z. Y., Shaikh, Z. A., & Gazizova, F. (2020). Using the concept of game-based learning in education. *International Journal of Emerging Technologies in Learning*, *15*(14), 53–64. https://doi.org/10.3991/ijet.v15i14.14675

Mahdum, M., Hadriana, H., & Safriyanti, M. (2019). Exploring Teacher Perceptions and Motivations to ICT Use in Learning Activities in Indonesia. *Journal of Information Technology Education: Research*, *18*, 293–317. https://doi.org/10.28945/4366

Matzavela, V., & Alepis, E. (2021). M-learning in the COVID-19 era: physical vs digital class. *Education and Information Technologies*, *26*(6), 7183–7203. https://doi.org/10.1007/s10639-021-10572-6

Mohamad, M. M., Sulaiman, N. L., Sern, L. C., & Salleh, K. M. (2015). Measuring the Validity and Reliability of Research Instruments. *Procedia - Social and Behavioral Sciences*, *204*. https://doi.org/10.1016/j.sbspro.2015.08.129

Niemi, H., Niu, S., Vivitsou, M., & Li, B. (2018). Digital storytelling for twenty-first-century competencies with math literacy and student engagement in China and Finland. *Contemporary Educational Technology*, *9*(4), 331–353. https://doi.org/10.30935/cet.470999

DOI: 10.31004/obsesi.v6i6.2022

Nikou, S., & Maslov, I. (2021). An analysis of students' perspectives on e-learning participation – the case of COVID-19 pandemic. *International Journal of Information and Learning Technology*, *38*(3), 299–315. https://doi.org/10.1108/IJILT-12-2020-0220

Nisa, H., Permana, A., & Firmansyah, R. (2020). Peranan Smarthphone Dalam Dunia Pendidikan Di Masa Pandemi Covid-19. *Tematik : Jurnal Teknologi Informasi Dan Komunikasi (e-Journal)*, *7*(2).

Notanubun, Z. (2019). Pengembangan Kompetensi Profesionalisme Guru di Era Digital (Abad 21). *Jurnal Bimbingan Dan Konseling Terapan*, *3*(2), 54. https://doi.org/10.30598/jbkt.v3i2.1058

Nur Jannah, I. (2020). Efektivitas Penggunaan Multimedia dalam Pembelajaran IPA di SD. *Jurnal Ilmiah Sekolah Dasar*, *4*(1), 54. https://doi.org/10.23887/jisd.v4i1.24135

OECD. (2019). PISA 2018 results: Combined executive summaries. *J. Chem. Inf. Model.*, *53*(9), 1689–1699. https://www.oecd.org/pisa/Combined_Executive_Summaries_PISA_2018.pdf

Oktaviyanthi, R., & Agus, R. N. (2019). Eksplorasi Kemampuan Pemecahan Masalah Berdasarkan Kategori Proses Literasi Matematis. *Jurnal Pendidikan Matematika*, *13*(2), 163–184. https://doi.org/10.22342/jpm.13.2.7066.163-184

Partovi, T., & Razavi, M. R. (2019). The effect of game-based learning on academic achievement motivation of elementary school students. *Learning and Motivation*, *68*, 101592. https://doi.org/10.1016/j.lmot.2019.101592

Patel, M., & Patel, N. (2019). Exploring Research Methodology. *International Journal of Research and Review*, *6*(3), 48–55. https://www.ijrrjournal.com/IJRR_Vol.6_Issue.3_March2019/Abstract_IJRR0011.html#:~:text=Research methodology is a way,with the logic behind them.

Perets, E. A., Chabeda, D., Gong, A. Z., Huang, X., Fung, T. S., Ng, K. Y., Bathgate, M., & Yan, E. C. Y. (2020). Impact of the emergency transition to remote teaching on student engagement in a non-stem undergraduate chemistry course in the time of covid-19. *Journal of Chemical Education*, *97*(9), 2439–2447. https://doi.org/10.1021/acs.jchemed.0c00879

Pilegard, C., & Mayer, R. E. (2016). Improving academic learning from computer-based narrative games. *Contemporary Educational Psychology*, *44–45*, 12–20. https://doi.org/10.1016/j.cedpsych.2015.12.002

Puritat, K. (2019). Enhanced Knowledge and Engagement of Students Through the Gamification Concept of Game Elements. *International Journal of Engineering Pedagogy (IJEP)*, *9*(5), 41. https://doi.org/10.3991/ijep.v9i5.11028

Puspaningtyas, N. D., & Ulfa, M. (2021). Pelatihan Soal Matematika Berbasis Literasi Numerasi pada Siswa SMA IT Fitrah Insani. *Jurnal Pengabdian Masyarakat MIPA Dan Pendidikan MIPA*, *4*(2), 137–140. https://doi.org/10.21831/jpmmp.v4i2.37504

Putikadyanto, A. P. A., Zamahsari, G. K., & Violando, W. A. (2021). Investigating Positive Perceptions of High School Students' Distance Learning Experiences During a Pandemic. *Abjadia*, *6*(2), 170–181. https://doi.org/10.18860/abj.v6i2.13874

Qodr, T. S., Efendi, A., & Musadad, A. A. (2021). Opportunities for Using Smartphones in the Digital Era to Facilitate Students in Learning Sociology in High Schools. *Journal of Education Technology*, *5*(2), 263–271. https://doi.org/10.23887/jet.v5i2.34806

Qohar, A., Susiswo, Nasution, S. H., & Wahyuningsih, S. (2021). Development of Android-Based Mathematics Learning Game on the Topic of Congruence and Similarity. *International Journal of Interactive Mobile Technologies*, *15*(9), 52–69. https://doi.org/10.3991/ijim.v15i09.20723

Qureshi, I. A., Ilyas, K., Yasmin, R., & Whitty, M. (2012). Challenges of implementing e-learning in a Pakistani university. *Knowledge Management and E-Learning*, *4*(3), 310–324. https://doi.org/10.34105/j.kmel.2012.04.025

Rasmitadila, Aliyyah, R. R., Rachmadtullah, R., Samsudin, A., Syaodih, E., Nurtanto, M., &

DOI: 10.31004/obsesi.v6i6.2022

Tambunan, A. R. S. (2020). The perceptions of primary school teachers of online learning during the covid-19 pandemic period: A case study in Indonesia. *Journal of Ethnic and Cultural Studies*, *7*(2), 90–109. https://doi.org/10.29333/ejecs/388

Revilda, E., Hadi, N., & Purwasih, J. H. G. (2021). Dampak Belajar Dari Rumah. *NATURALISTIC : Jurnal Kajian Penelitian Pendidikan Dan Pembelajaran*. https://doi.org/10.35568/naturalistic.v5i2.1133

Riyatuljannah, T., & Fatonah, S. (2021). Analisis Kemampuan Literasi Matematika Siswa Pada Penyelesaian Soal Berorientasi Konten Quantity. *EDU-MAT: Jurnal Pendidikan Matematika*, *9*(1), 59. https://doi.org/10.20527/edumat.v9i1.10089

Roemintoyo, & Budiarto, M. K. (2021). Flipbook as Innovation of Digital Learning Media : Preparing Education for Facing and Facilitating 21st Century Learning. *Journal of Education Technology*, *5*(1), 8–13. https://doi.org/https://doi.org/10.23887/jet.v%25vi%25i.32362

Rosidah, U. A., Marwoto, P., & Subali, B. (2021). Analysis of the Need for Android Based Mobile Learning Development to Improve Student Science Literations. *Jurnal Penelitian Pendidikan IPA*, *7*(4), 601–606. https://app.dimensions.ai/details/publication/pub.1142792907%0Ahttps://jppipa.unram.ac.id/index.php/jppipa/article/download/805/pdf

Saikat, S., Dhillon, J. S., Ahmad, W. F. W., & Jamaluddin, R. A. (2021). A systematic review of the benefits and challenges of mobile learning during the covid-19 pandemic. In *Education Sciences* (Vol. 11, Issue 9). https://doi.org/10.3390/educsci11090459

Salim, H. (2019). Penelitian Pendidikan : Metode, Pendekatan, dan Jenis. In *Jakarta: Kencana*.

Saputri, D. Y., Rukaya, R., & Indri, M. (2018). Need Assessment of Interactive Multimedia Based on Game in Elementary School: A Challenge into Learning in 21st Century. *International Journal of Educational Research Review*, *3*(3), 1–8. https://doi.org/10.24331/ijere.411329

Sari, T. T. (2020). Self-Efficacy dan Dukungan Keluarga Dalam Keberhasilan Belajar Dari Rumah di Masa Pandemi Covid-19. *Education Journal : Journal Educational Research and Development*, *4*(2), 127–136. https://doi.org/10.31537/ej.v4i2.346

Schneider, S. L., & Council, M. L. (2021). Distance learning in the era of COVID-19. In *Archives of Dermatological Research* (Vol. 313, Issue 5, pp. 389–390). https://doi.org/10.1007/s00403-020-02088-9

Shabrina, L. M. (2022). Kegiatan Kampus Mengajar dalam Meningkatkan Keterampilan Literasi dan Numerasi Siswa Sekolah Dasar. *Jurnal Basicedu*, *6*(1), 916–924. https://doi.org/10.31004/basicedu.v6i1.2041

Sholihah, A. N. N., Septiani, I., Rejekiningsih, T., Triyanto, & Rusnaini. (2020). Development of interactive multimedia learning courseware to strengthen students' character. *European Journal of Educational Research*, *9*(3), 1267–1279. https://doi.org/10.12973/eu-jer.9.3.1267

Sikora, J., Evans, M. D. R., & Kelley, J. (2019). Scholarly culture: How books in adolescence enhance adult literacy, numeracy and technology skills in 31 societies. *Social Science Research*, *77*, 1–15. https://doi.org/10.1016/j.ssresearch.2018.10.003

Sinaga, R. M., Trisnaningsih, T., Pujiati, P., & Sudarmansyah, D. (2019). Development of Learning Media Based on Mobil Learning Application. *Jurnal Pendidikan Progresif*, *9*(1), 50–58. https://doi.org/10.23960/jpp.v9.i1.201907

Som, S. (2021). ICT In Education : Opportunities and Challenges. *International Journal of Research*, *7*(1), 156–163. http://www.iisrr.in/mainsite/wp-content/uploads/2021/02/16.-Sanghamitra-Som-ICT-In-Education-Opportunities-and-Challenges-converted.pdf

Stančin, K., Hoić-Božić, N., & Skočić Mihić, S. (2020). Using digital game-based learning for students with intellectual disabilities - A systematic literature review. *Informatics in Education*, *19*(2), 323–341. https://doi.org/10.15388/INFEDU.2020.15

DOI: 10.31004/obsesi.v6i6.2022

Stošić, L. (2015). The importance of educational technology in teaching. *International Journal of Cognitive Research in Science, Engineering and Education*, *3*(1), 111–114. https://doi.org/10.23947/2334-8496-2015-3-1-111-114

Su, Y. S., Cheng, H. W., & Lai, C. F. (2022). Study of Virtual Reality Immersive Technology Enhanced Mathematics Geometry Learning. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.760418

Sulaiman, J., & Ismail, S. N. (2020). Teacher competence and 21st century skills in transformation schools 2025 (TS25). *Universal Journal of Educational Research*, *8*(8), 3536–3544. https://doi.org/10.13189/ujer.2020.080829

Sulistio, W., & Qohar, A. (2020). Development of Instructional Media "Game Math Comic Story" Based Android on Number. *Journal of Education Research and Evaluation*, *4*(2), 109. https://doi.org/10.23887/jere.v4i2.22370

Surahman, E. (2019). Integrated mobile learning system (IMOLES) sebagai upaya mewujudkan masyarakat pebelajar unggul era digital. *JINOTEP (Jurnal Inovasi Dan Teknologi Pembelajaran) Kajian Dan Riset Dalam Teknologi Pembelajaran*, *5*(2). https://doi.org/10.17977/um031v5i22019p050

Suryanti, & Wijayanti, L. (2018). Literasi Digital : Kompetensi Mendesak Di Era Revolusi Industri 4.0. *Jurnal Pendidikan Dasar*. https://doi.org/https://doi.org/10.26740/eds.v2n1.p1-9

Troussas, C., Krouska, A., & Sgouropoulou, C. (2020). Collaboration and fuzzy-modeled personalization for mobile game-based learning in higher education. *Computers and Education*, *144*. https://doi.org/10.1016/j.compedu.2019.103698

Tsai, M. J., Huang, L. J., Hou, H. T., Hsu, C. Y., & Chiou, G. L. (2016). Visual behavior, flow and achievement in game-based learning. *Computers and Education*, *98*, 115–129. https://doi.org/10.1016/j.compedu.2016.03.011

Waminton, R., & Erlinawaty, S. (2015). Problem-Based Mathematics Teaching Kits Integrated With Ict To Improve Students ' Critical Thinking Ability. *Cakrawala Penididikan*, *34*(3), 347–356. https://doi.org/https://doi.org/10.21831/cp.v3i3.7342

Wardoyo, C., Satrio, Y. D., Narmaditya, B. S., & Wibowo, A. (2021). Do technological knowledge and game-based learning promote students achievement: lesson from Indonesia. *Heliyon*, *7*(11). https://doi.org/10.1016/j.heliyon.2021.e08467

Warsita, B. (2018). Teori Belajar Robert M. Gagne Dan Implikasinya Pada Pentingnya Pusat Sumber Belajar. *Jurnal Teknodik*, 064–078. https://doi.org/10.32550/teknodik.v12i1.421

Yulianci, S., Nurjumiati, N., Asriyadin, A., & Adiansha, A. A. (2021). The Effect of Interactive Multimedia and Learning Styles on Students' Physics Creative Thinking Skills. *Jurnal Penelitian Pendidikan IPA*, *7*(1), 87. https://doi.org/10.29303/jppipa.v7i1.529

Zaheer, S., Butt, S. M., Anatolyevna, G. V., & Salmani, H. (2018). Do Mobile Technology in the Classroom Really Improve Learning Outcomes? *International Journal of Evaluation and Research in Education (IJERE)*, *7*(3), 188. https://doi.org/10.11591/ijere.v7i3.13426

Zou, D., Huang, Y., & Xie, H. (2021). Digital game-based vocabulary learning: where are we and where are we going? In *Computer Assisted Language Learning* (Vol. 34, Issues 5–6, pp. 751–777). https://doi.org/10.1080/09588221.2019.1640745

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