



Analysis of the Needs for the Development of Gamification Based Mobile Learning Media

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Abstract. This research is an initial study to describe the results of the teacher needs analysis and the results of the student needs analysis on the development of gamification-based mobile learning media in elementary schools. The research method used in this initial research was descriptive qualitative research using an observational approach through the stages of data collection, data reduction, data presentation and in the end conclusions were drawn as a result of the research. The subjects of this study were 26 elementary school teachers and 72 elementary school students in Surakarta who were randomly selected. The research instrument used was a questionnaire and a questionnaire. Data analysis was used by calculating the percentage of the results of distributing questionnaires and questionnaires distributed to teachers and students. The research results show that out of 26 elementary school teachers in Surakarta city, they responded that 69.2% had not implemented gamification-based mobile learning. 23.1% have implemented gamification-based mobile learning and the remaining 7.7% have implemented it but it is still rare. In addition, the results of the analysis of student needs show a percentage of 72.2% responding that they enjoy learning using gadgets and 27.8% are not happy learning by using gadgets. From the aspect of whether teachers need to provide learning media presented in the form of games 87.5% of students respond to the need for game-based media and only 12.5% provide unnecessary answers. Thus the results of this observation provide reinforcement that the development of gamification-based mobile learning media is needed by teachers and students in learning.

Keywords: gamification, mobile learning, primary education

1 Introduction

Technological developments are currently experiencing very fast leaps, this requires every educational paradigm to always be dynamic in developing educational technology. Information and communication technology advancements have brought about improvements and adjustments in a number of fields, most notably education. Information and communication technology plays a critical role in education and can facilitate learning for both teachers and students (Wahyuni et al., 2021). Educational technology greatly determines the output or outcomes that will be produced by each

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learning process. In addition, good educational technology must be in accordance with the foundation of educational technology, namely it must be designed appropriately, developed according to the level of urgency needed for educational technology, its usefulness, its management and always tested for feasibility.[2]. Educational technology is very necessary in the learning process, one of which is as a medium in conveying learning material for students so that it is easily accepted and understood, so that in the end it can have a positive impact on learning[3].

Information and communication technology is currently growing rapidly with diversity in supporting various activities, including greatly supporting the process of learning activities[4]. Information and communication technology today is not only a means of communication and information but also provides benefits in the learning process, especially as a learning medium. Learning media by utilizing technology will provide a different learning climate to students so as to present learning motivation. In addition, the existence of media by utilizing technology can stimulate the relationship between one material and another[5]. Making it easier for teachers to connect learning with factual events that are currently happening at this time.

The fact that is happening at this time, in the learning process not so many teachers utilize information and communication technology as learning media. So it is necessary to develop technology-based learning media that can be used by teachers in teaching their students so that they can facilitate students in learning and understanding learning material. Learning media based on information and communication technology that is developed is expected to make it easier for students to learn, both learning anywhere, anytime and with anyone. In addition, good learning media developed by teachers apart from being practical must be inclusive, meaning that they can be empowered and utilized not only by students in general but have the advantage of being able to be utilized by students with special needs. Creative learning in the school environment does not only pay attention to the physical conditions of students with special needs, but creative learning by prioritizing the principles of inclusive education can be integrated with a variety of learning media, thereby creating a friendly learning environment for all.[6]. The following are the results of initial observations of the mathematics learning outcomes of class V students in the Diponegoro Cluster, Laweyan District:

Table 1. Preliminary Observations of Average Grade V Mathematics Learning Outcomes

No.	School name	Average Mathematics Learning Outcomes
1	SDN Laweyan	70,56
2	SDN Setono	67,78
3	Sdn Bratan I	68,89
4	SDN Bratan II	70,00
5	SDN Bratan III	69,80
6	SDN Sayangan	65,89
	Average	68,82

From table 1 above it can be explained that the average result of mathematics learning outcomes in the Diponegoro Group, Laweyan District, is 68.82. success. In

addition, the average grade V mathematics learning result with a score of 68.82 indicates that the level of achievement still does not meet the minimum completeness criteria (KKM). The average achievement level of low mathematics learning outcomes for students is given a diagnosis that there are some students who experience learning difficulties in mathematics. Mathematics learning difficulties are also called dyscalculia (dyscalculis) (Larner, 1988:430). According to Larner (1981:357) there are several characteristics of children with learning difficulties in mathematics, namely (1) disturbances in spatial relations, (2) early perceptual abnormalities, (3) visual-motor associations, (4) perseveration, (5) difficulty recognizing and understanding symbols, (6) disturbances in body appreciation, (7) difficulty in language and reading, and (8) performance IQ is much lower than verbal IQ scores. Students who experience dyscalculia may experience problems in understanding simple number concepts (numbers), lack of understanding and perception of a number and have learning problems in terms of counting and its procedures. This can be seen in relation to real-life realities such as telling time, calculating prices, measuring speed and so on (5) difficulty recognizing and understanding symbols, (6) impaired appreciation of the body, (7) difficulty in language and reading, and (8) performance IQ is much lower than the verbal IQ score. Students who experience dyscalculia may experience problems in understanding simple number concepts (numbers), lack of understanding and perception of a number and have learning problems in terms of counting and its procedures. This can be seen in relation to real-life realities such as telling time, calculating prices, measuring speed and so on (5) difficulty recognizing and understanding symbols, (6) impaired appreciation of the body, (7) difficulty in language and reading, and (8) performance IQ is much lower than the verbal IQ score. Students who experience dyscalculia may experience problems in understanding simple number concepts (numbers), lack of understanding and perception of a number and has learning problems in terms of counting and its procedures. This can be seen in relation to real-life realities such as telling time, calculating prices, measuring speed and so on lack of understanding and perception of a number and has learning problems in terms of counting and its procedures. This can be seen in relation to real-life realities such as telling time, calculating prices, measuring speed and so on lack of understanding and perception of a number and has learning problems in terms of counting and its procedures. This can be seen in relation to real-life realities such as telling time, calculating prices, measuring speed and so on [7].

For elementary school pupils, learning and play are interwoven during this phase of the curriculum, so engaging and play-based learning materials are anticipated. Elementary school pupils, in Piaget's view, represent a specific operational phase in which each medium should be presented comprehensively or as a whole [8]. Play can be incorporated into educational media to illustrate learning concepts. Because they are learning and having fun, pupils will never get bored and will always be motivated to learn. In order for it to ultimately have a favorable effect on learning objectives and learning activities.

To boost learning motivation, educational materials bundled with play components are desperately needed right now. Mobile learning with gamification One type of media that can be used to boost student motivation is me-dia. The nexus of mobile

computing with e-learning is known as mobile learning, and it offers materials that are accessible from any location, robust search features, engaging interactions, complete support for efficient learning, and performance-based evaluation[9]. There are aspects of e-learning that are not reliant on time or location. In the same way that learning mobility is related to mobile learning, mobile learning allows students to participate in educational activities without being restricted to a specific physical space. Students' higher-order thinking skills are developed by using mobile learning resources in addition to raising their motivation to learn[10]. Despite the limited number of student classrooms, mobile learning offers chances for critical reflection, access to evolving knowledge, and efficient use of information technology[11].

Mobile learning materials with gamification features can improve students' learning activities. The technique of designing games with the intention of altering the current learning process is known as gamification in the context of education [12]. Gamification tends to have a positive effect on different types of results learned, though with results various. Gamification is a method that integrates game design, game mechanics, and game thinking to make non-gaming environments (including learning, teaching, and marketing) more engaging[13]. Therefore, it is anticipated that gamification-based mobile learning will boost student engagement with the material, which will ultimately boost their drive to learn.

2 Method

The research method used in this initial research was descriptive qualitative research using an observational approach through the stages of data collection, data reduction, data presentation and in the end conclusions were drawn as a result of the research.

3 Result

The preliminary study's findings indicated that the teacher primarily employed instructional material for instruction, with little to no use of gamification-based mobile learning resources. The findings of observations conducted on 26 elementary school teachers in the city of Surakarta, who stated that none of the 26 instructors they interviewed had used the gamification-based mobile learning paradigm, supported this. The following diagram illustrates this observation's findings.

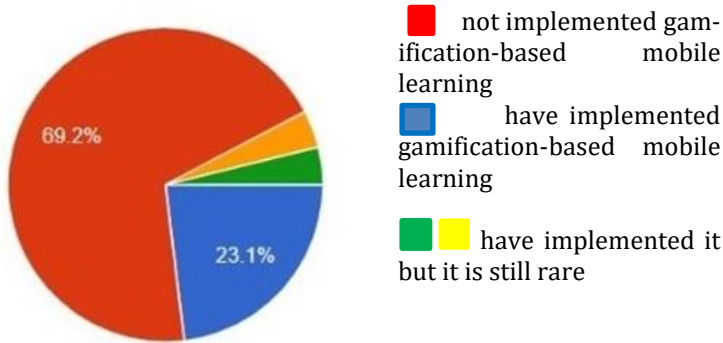


Fig. 1. Teachers response results

From diagram 1 above, it can be understood that 69.2% of the 26 Surakarta primary school teachers who were randomly interviewed stated they had not used gamification-based mobile learning. Gamification-based mobile learning has been adopted by 23.1% of respondents, while the remaining 7.7% have done so, but infrequently. The findings of this observation support the notion that educators must provide gamification-based mobile learning resources. The findings of earlier research by [14] explain why applying the gamification concept to education might boost students' interest and engagement in the process of learning. Research demonstrating that mobile learning can improve student independence and learning outcomes is another study that highlights the necessity of gamification-based mobile learning [15].

The findings of the study of observational data regarding teacher needs indicate that, particularly when it comes to teaching mathematics to students with disabilities, teachers truly require gamification-based mobile learning resources. One learning challenge in studying mathematics is dyscalculia. Due to its impairment with the ability to calculate mathematical expressions, dyscalculia is frequently referred to as "math difficulty". This difficulty can be broken down into quantitative review categories such as counting and calculating. The affected child will exhibit difficulties comprehending mathematical concepts. The appearance of learning challenges and the completion of tasks using numbers or mathematical symbols are typically indicators of this [16]. Learning variables, internal factors, and external circumstances can all be the root cause of learning issues. Physical and mental aspects are considered internal variables; schools, communities, and families are considered external factors; and learning factors include the teacher's approach to teaching, learning models, and assessment [17]. Following are the results of observations of teacher needs analysis through interviews with elementary school teachers in the city of Surakarta on the urgency of developing gamification-based mobile learning media in mathematics learning for students with disabilities, especially for grade 5 elementary school students.

Table 2.

Question	Need	No need
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In your opinion, is it still necessary to develop gamification-based mobile learning media?	92.3%	7.7%
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Table 3.

Question	Need	No need
In your opinion, do you need special learning media to improve learning outcomes for students with disabilities?	100%	0%

From Table 2 and Table 3 above it can be explained that the results of interviews with teachers showed that 92.3% of the 26 teachers who were interviewed wanted the need to develop gamification-based mobile learning media, and 100% of all teachers wanted special learning media to improve learning outcomes dyscalculia students. The results of the preliminary study and needs analysis above are the basis of this research to develop gamification-based mobile learning media to improve mathematics learning outcomes for fifth grade students with disabilities. In the current learning era, technology-based learning media is urgently needed, especially in the concept of gamification-based mobile learning so that students are motivated and more involved in learning[18]. Research done[19],Junita (2019),Nurhidayat et al. (2020)has conducted research on the development of gamification-based media but has not accommodated it to facilitate the needs of fifth grade mathematics learning, especially for students with disabilities. In addition, the learning media used in several elementary schools in the city of Surakarta have not developed gamification-based mobile learning media for grade 5 mathematics learning, especially for students with disabilities.

From the results of the preliminary study it was found that in learning students prefer to use gadgets in learning. This was reinforced by the results of observations made on 72 students in the city of Surakarta who gave the response that of the 72 students interviewed gave a response that they preferred using gadgets in learning activities as learning media. The results of this observation can be seen through the following diagram.

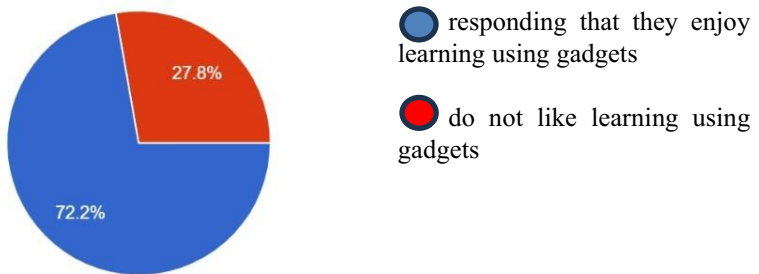


Fig. 2. Student response results

From diagram 2 it can be explained that the percentage shows 72.2% responding that they enjoy learning using gadgets and 27.8% do not like learning using gadgets. This shows that mobile learning-based media is needed by students to support learning activities, in particular. This was reinforced by the results of the responses of 72 students, most of whom responded that students preferred using gadgets in a game as learning media. The results of these student responses can be presented in diagram 3 below.

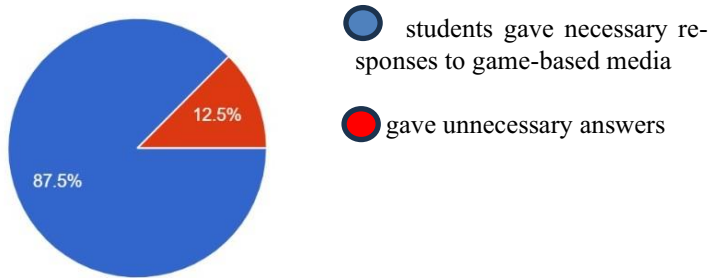


Fig. 3. Student response results

From diagram 3 it can be explained that students responded that the teacher needed to provide learning media presented in the form of games 87.5% of students gave necessary responses to game-based media and only 12.5% gave unnecessary answers. Therefore, the findings of this observation confirm that teachers and students need to build gamification-based mobile learning materials in order to learn.

4 Conclusion

According to the research findings, 69.2% of the 26 elementary school teachers in Surakarta City who participated in the survey had not used gamification-based mobile learning. Gamification-based mobile learning has been adopted by 23.1% of respondents, while the remaining 7.7% have done so, but infrequently. In addition, the results of the analysis of student needs show a percentage of 72.2% responding that they enjoy learning using gadgets and 27.8% are not happy learning by using gadgets. From what aspect does the teacher need to provide learning media. Thus it can be concluded media developmentthe development of gamification-based mobile learning media in elementary schools is still very much needed, especially to improve the learning outcomes of students with disabilities.

References

1. D. R. Wahyuni, V. Aulia, and R. Febrianno Boer, "Instructional Communication Process in Online Learning (School From Home) during Covid-19 Pandemic," *Agustus*, vol. 2021, no. 2, pp. 81–94, 2021, [Online]. Available: <http://journal.unj.ac.id/unj/index.php/jtp>

2. Haryanto, "buku Teknologi Pendidikan.pdf." pp. 1–5, 2015.
3. Elvani Hertati, "Analysis of Android-Based Educational Game Media Development Needs for Social Studies Learning in Elementary Schools," *JTP - J. Teknol. Pendidik.*, vol. 24, no. 1, pp. 1–8, 2022, doi: 10.21009/jtp.v24i1.22552.
4. I. Theories and I. Theories, *Instructional-Design Theories and Models, Volume IV*. 2016. doi: 10.4324/9781315795478.
5. D. R. Tobergte and S. Curtis, "Teaching in a digital age," *J. Chem. Inf. Model.*, vol. 53, no. 9, pp. 1689–1699, 2013, doi: 10.1017/CBO9781107415324.004.
6. I. Yuwono and M. Mirnawati, "Strategi Pembelajaran Kreatif dalam Pendidikan Inklusi di Jenjang Sekolah Dasar," *J. Basicedu*, vol. 5, no. 4, pp. 2015–2020, 2021.
7. J. baswara Adhim, "Identifikasi anak kesulitan belajar matematika (diskalkulia) di Sekolah dasar," *J. Pendidik. khusus*, vol. 12, no. 3, pp. 1 & 3, 2019.
8. L. Marinda, "Teori Perkembangan Kognitif Jean Piaget Dan Problematikanya Pada Anak Usia Sekolah Dasar," *An-Nisa' J. Kaji. Peremp. dan Keislama.*, vol. 13, no. 1, pp. 116–152, 2020, doi: 10.35719/annisa.v13i1.26.
9. B. Nurhidayat, A. Wedi, and H. Praherdhiono, "Pengembangan Multimedia Mobile Learning Berbasis Smartphone Android Materi Huruf Madura untuk SD Negeri 1 Perante Kabupaten Situbondo," *JINOTEP (Jurnal Inov. dan Teknol. Pembelajaran) Kaji. dan Ris. Dalam Teknol. Pembelajaran*, vol. 6, no. 2, pp. 103–110, 2020, doi: 10.17977/um031v6i22020p103.
10. S. Damrongpanit, "European Journal of Educational Research," *Eur. J. Educ. Res.*, vol. 10, no. 3, pp. 1075–1088, 2022, [Online]. Available: https://www.researchgate.net/profile/Suntonrapot-Damrongpanit/publication/356662582_Effects_of_Mindset_Democratic_Parenting_Teaching_and_School_Environment_on_Global_Citizenship_of_Ninth-grade_Students/links/61a6dda685c5ea51abc0f7b6/Effects-of-Mindset-Dem
11. P. Aubusson, S. Schuck, and K. Burden, "Mobile learning for teacher professional learning: benefits, obstacles and issues," *Alt-J*, vol. 17, no. 3, pp. 233–247, 2009, doi: 10.1080/09687760903247641.
12. M. Sailer and L. Homner, "The Gamification of Learning: a Meta-analysis," *Educ. Psychol. Rev.*, vol. 32, no. 1, pp. 77–112, 2020, doi: 10.1007/s10648-019-09498-w.
13. H. Setiana and S. Hansun, "Gamified Android Based Academic Information System," vol. 6, no. 2, pp. 164–173, 2017.
14. S. Nurul and M. Mohamad, "Gamification Approach in Education to Increase Learning Engagement," *Int. J. Humanit. Arts Soc. Sci.*, vol. 4, no. 1, pp. 22–32, 2018, doi: 10.20469/ijhss.4.10003-1.
15. S. Sakiyah, M. Mustaji, and M. T. Yani, "Pengembangan Mobile Learning dengan Pendekatan Saintifik untuk Meningkatkan Kemandirian dan Hasil Belajar IPS di Kelas IV SD," *PENDIPA J. Sci. Educ.*, vol. 6, no. 1, pp. 193–200, 2021, doi: 10.33369/pendipa.6.1.193-200.
16. E. Setyo Budiyanoro, "Aplikasi Game Mengenalkan Angka Untuk Anak Diskalkulia Ringan Berbasis Android," *Repository.Untag-Sby.Ac.Id*, no. 031, 2018, [Online]. Available: <http://repository.untag-sby.ac.id/id/eprint/844>
17. Z. Latifah, "Meningkatkan Kemampuan Menjumlah Anak Diskalkulia dengan Media Stamp Game," *J. Pendidik. Kebutuhan Khusus*, vol. 5, no. 1, pp. 1–11, 2021, doi: 10.24036/jpkk.v5i1.555.

18. S. Aljraiwi, "Effectiveness of gamification of web-based learning in improving academic achievement and creative thinking among primary school students," *Int. J. Educ. Pract.*, vol. 7, no. 3, pp. 242–257, 2019, doi: 10.18488/journal.61.2019.73.242.257.
19. H. Jusuf, "Penggunaan Gamifikasi dalam Proses Pembelajaran," *J. TICOM*, vol. 5, no. 1, pp. 1–6, 2016, [Online]. Available: <https://media.neliti.com/media/publications/92772-ID-penggunaan-gamifikasi-dalam-proses-pembe.pdf>
20. W. Junita, "Penggunaan mobile learning sebagai media dalam pembelajaran," *Pros. Semin. Nas. Teknol. Pendidik. Pascasarj. UNIMED*, pp. 602–609, 2019, [Online]. Available: http://digilib.unimed.ac.id/38863/3/ATP_69.pdf

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