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The Effectiveness of Matific Interactive Game Media to Improve Mathematics Learning Outcomes of Grade VII Students on the Matter of Integers

Rahtu Dila Romita^{1✉}, Rahayu Prastika², Rosa Riswana Putri³, Ummul Hafizhah⁴, Fridgo Tasman⁵

Mathematics Education, Padang State University^{1,2,3,4,5}

E-mail: rahtudilaromita909@gmail.com¹, rahayuprastika7@gmail.com², rosariswana@gmail.com³, ummulhafizhah312@gmail.com⁴, fridgo_tasman@fmipa.unp.ac.id⁵

Abstrak

Pembelajaran matematika sering dianggap sulit oleh siswa, hal ini menuntut kreatifitas guru matematika untuk berinovasi, salah satunya dengan menggunakan media pembelajaran interaktif seperti *Matific*. Tujuan penelitian ini adalah untuk mengetahui efektif atau tidaknya penggunaan media game interaktif *Matific* untuk meningkatkan hasil belajar matematika siswa kelas VII SMP Negeri 7 Padang pada materi bilangan bulat. Penelitian ini menggunakan metode kualitatif dengan pemberian angket. Hasil penelitian penggunaan media game interaktif *matific* sudah berjalan efektif pada pembelajaran matematika khususnya bilangan bulat dan mampu meningkatkan hasil belajar siswa. Hal ini dibuktikan dengan persentase hasil penilaian angket siswa sebesar 88,45% yang berarti game *Matific* sangat efektif sebagai media pembelajaran interaktif. Penelitian ini berkontribusi pada bidang pendidikan dalam mengembangkan keterampilan matematika, meningkatkan keterlibatan siswa, dan mengurangi kecemasan siswa melalui game edukasi yang memanfaatkan teknologi dalam proses belajar mengajar. Keterlibatan siswa dalam proses pembelajaran matematika berhubungan dengan meningkatnya hasil belajar siswa. Untuk itu diharapkan matematika tidak lagi dianggap sebagai pembelajaran yang sulit oleh siswa.

Kata Kunci: Game Interaktif *Matific*, Hasil Belajar Siswa, Bilangan Bulat.

Abstract

Math learning is often considered difficult by students, this requires the creativity of math teachers to innovate, one of which is by using interactive learning media such as Matific. The purpose of this study was to determine whether or not the use of Matific interactive game media was effective in improving the learning outcomes of seventh grade mathematics students at SMP Negeri 7 Padang on integer material. This study uses a qualitative method by giving a questionnaire. The results of the research on the use of interactive game media Matific has been running effectively in learning mathematics, especially integers and is able to improve student learning outcomes. This is evidenced by the percentage of student questionnaire assessment results of 88.45% which means that Matific games are very effective as interactive learning media. This research contributes to the field of education in developing mathematics skills, increasing student engagement, and reducing student anxiety through educational games that utilize technology in the teaching and learning process. Student involvement in the mathematics learning process is related to increased student learning outcomes. For this reason, it is hoped that mathematics will no longer be considered a difficult lesson by students.

Keywords: *Matific Interactive Games, Student Learning Outcomes, Integers*

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✉Corresponding author :

Email : rahtudilaromita909@gmail.com

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INTRODUCTION

The tight competition in the era of globalization is inevitable, so Indonesia needs to prepare a superior quality society by involving the world of education in dealing with it. Education is an important means of improving superior human resources, both through formal and non-formal channels. One of the most important elements in efforts to improve the quality of human resources is by improving the quality of education (Wiwien & Restu, 2019). Education is a series of learning activities that include knowledge, skills and attitudes that are carried out deliberately, carefully, and planned. The role of the teacher as a facilitator is very important in this educational process, to direct and build student potential in various fields, such as intellectual potential, skill potential, social potential, creative potential, and other potentials. Providing subject matter by the teacher becomes the basis for students in obtaining learning achievements. However, the obstacle that students often face in obtaining learning achievements is that satisfactory learning outcomes have not been achieved.

According to Sudjana, learning outcomes are the abilities that exist in students after receiving or taking their learning experience (Sudjana, 2002). Learning outcomes play a very important role in the learning process, because with learning outcomes the teacher can find out the development of experience/knowledge that students have in an effort to achieve learning goals through the next learning process. In delivering material during learning activities, media is needed as a means of transferring knowledge from teachers to students (Agusti & Aslam, 2022). Thus it can be concluded that the media plays an important role in helping students during the teaching and learning process.

Math learning is often considered difficult by students, so that not a few students consider math as something that should be avoided. The abstract characteristics of mathematics, the use of many symbols, and confusing formulas make mathematics considered a difficult learning (Auliya, 2016). This difficulty requires the creativity of mathematics teachers to innovate in terms of methods and mathematics learning media used so that learning objectives are achieved. One of the innovations that teachers can do is to use games as a medium for learning math. This is supported by research conducted by (Hendrawan & Marlina, 2022) in one of the schools in the Karawang area, it was found that the majority of students, 86%, agreed that the use of educational games as a medium or learning tool made learning math easier for them to understand.

In line with the results of observations and interviews with seventh grade students of SMP Negeri 7 Padang in April 2024, it was concluded that the majority of students are familiar with games and are very happy to play them. Some students said that when playing games, they feel positive feelings, such as being excited and interested. However, most of them play games just for entertainment without any learning element in it. So that it affects the low learning outcomes of students. The low learning outcomes are because students are still constrained in the material of adding and subtracting whole numbers, and the media is not realized as a teaching tool properly, causing students to lose interest in learning, resulting in decreased learning outcomes.

Based on the explanation and observation results above, researchers are interested in conducting research on the use of interactive game media, namely using the Matific application. Matific is an interactive game-based learning application that aims to improve students' math learning outcomes through intuitive visual lessons that are sequenced into the mathematics curriculum (Attard, 2016). Matific can be accessed through the Matific website (<https://www.matific.com/id/id/home/matific.com/id/id/home/>) or directly download through the playstore which has been designed for smartphones, computers, and laptops. Matific games are designed according to students' daily lives that make math relevant and easy to understand (Segmeasurement, 2017). Each mathematical concept in Matific is linked to the math curriculum and presents questions with gradual difficulty levels (Attard, 2016). The curriculum on Matific contains over 400

interactive math games and activities that cover math skills ranging from basic counting and shapes to fractions, measurement, algebra basics, and more for elementary and middle school levels. Matific can be used with a variety of learning methods and models tailored to the needs of each student. This can be an opportunity to utilize Matific as an innovative learning media.

Previous research that is similar and related to this research is research that has been conducted by (Manny-Ikan et al., 2016) Matific interactive games used as mathematics learning media can increase student interest, motivation, and reduce math anxiety so that it has an impact on student learning outcomes that improve. Matific makes math fun and is not seen as difficult learning. This is supported by research conducted by (Segmeasurement, 2017) for a year in 2017 on the effectiveness of using Matific on mathematics learning with 1477 student participants, the results showed that students in classes that used Matific games experienced a significant increase in math learning outcomes compared to students in classes whose mathematics learning was without Matific. These results support the effectiveness of using Matific in improving student math learning outcomes. Further research was conducted by (Attard, 2016) the use of Matific can increase student engagement in mathematics learning and assist students in learning and understanding challenging mathematical concepts. The results of research conducted by (Birbal et al., 2023) Matific affects male students' attitudes, motivation, and engagement in learning mathematics.

From several of these studies and existing problems, research on the use of the Matific game application is considered effective as a mathematics learning medium because Matific increases student interest, motivation and involvement, and reduces students' mathematics anxiety. Most of the Matific implementation research conducted is at the elementary school level, there are still few who carry out Matific implementation research at secondary schools, so it is necessary to study the effectiveness of Matific applications for secondary school students. In Indonesia, research related to Matific applications has never been carried out, especially at SMP Negeri 7 Padang. Regarding this matter, researchers are interested in conducting research on whether or not Matific interactive game media is effective in improving the mathematics learning outcomes of class VII students on integer material which is expected to be an innovation in mathematics learning by implementing effective and interactive learning media so that learning objectives are achieved.

METHODS

This research uses qualitative methods. The type of data used in this research is qualitative descriptive data. By using qualitative descriptive data, the researcher will explain how the effectiveness of *Matific* interactive game media improves student math learning outcomes, especially in integer material and how the research subject's opinion is related to *Matific* interactive games. This research was conducted at SMP Negeri 7 Padang class VII.2 on Wednesday, May 22, 2024 which was conducted at 07.30 WIB - 09.40 WIB. The source of research data is obtained from the results of student questionnaires.

One of the things that supports research is data collection. The data collection steps used by researchers are as follows:

1. Inquiry

The questionnaire was used to find out students' responses to learning mathematics with *matific*, especially whole number material. *Likert scale* is used to calculate the questionnaire and the statements presented are positive and negative. Subjects rated 25 statements on a scale of very good, good, enough, and less and free answers in the form of opinions and suggestions. The *Likert scale* is in the form of a checklist, and responses are scored with the following categories:

- a) Very good (SB) with a scale of 4

- b) Good (B) with a scale of 3
- c) Fair (C) with a scale of 2
- d) Less (K) with a scale of 1

2. Documentation

Data collection techniques can also be in the form of facts collected by recording in the form of image archives, journals, and letters for daily activities, the information used with this data collection technique is data that can be used to find out about previous information. Documentation is a technique for obtaining data and information in the form of books, archives, notes, written pictures and images in the form of reports and information that can help research.

This study uses qualitative data analysis techniques and to process data / to determine the effectiveness of using measurements with a Likert scale. *Likert scale* is a measurement used to measure the attitudes, perceptions, and views of a person/group towards social events and events. Questionnaires in the form of a *Likert scale* are used to disseminate answer criteria to respondents. Respondents who use *matific* interactive game media are generally asked explicitly and choose one option from four options. Starting from very good to less. Later the percentage results will be used to provide answers to the feasibility of the aspects studied. After obtaining the level of effectiveness of the *matific* game as an interactive learning media, the next data analysis technique in this study is:

a) Data Reduction

Data reduction means making a summary, selecting the main issues, focusing on the data under study and discarding unnecessary data. The stages of reducing data in this study are: 1) Conducting a preliminary study at SMP Negeri 7 Padang, which aims to find out the use of *matific* as a mathematics learning media; 2) Determining research subjects to be used as informants; 3) Observing and collecting data as an interactive learning media in learning mathematics implemented by class VII.2 teachers at SMP Negeri 7 Padang; 4) Recording the opinions and suggestions of teachers and students contained in the final sheet of the questionnaire at SMP Negeri 7 Padang.

b) Data Presentation

The data in this research is presented in the form of narrative text. The data is organized in the form of a brief description so that it is easy to understand the phenomena that occur and prepare the next action to be taken based on what has been understood.

c) Verification of Conclusions

This research carried out verification and drawing conclusions to see the results of the questionnaire and suggestions as well as opinions of teachers and students regarding the use of *matific* as a mathematics learning medium in class VII integer material. The questionnaire given to validators is used to assess the quality and suitability of *matific* media both in terms of material and learning media. Validators are welcome to comment, provide input for product development. Next, a questionnaire will be distributed to students to find out what students think about infographic learning media. The criteria for the effectiveness of *matific* interactive game media are presented in table 1.

Table 1. Effectiveness Criteria

Value (%)	Criteria
76-100	Very effective
56-75	Effective
41-55	Less effective
0-40	Very effective

It is concluded that this research may be able to answer the formulation of research problems, but maybe not, because in qualitative research, problems and problem formulations are temporary and will develop after research is in the field.

RESULTS AND DISCUSSION

After using Matific, students were given a questionnaire to assess the Matific game with assessment aspects including game appearance, ease of use of the game, and game interactivity. The results of the research conducted by researchers are in the form of student response data obtained from the results of distributing questionnaires to students regarding the utilization of Matific learning media.

Based on the research results obtained from the questionnaire given to 29 students in class VII.2 of SMP Negeri 7 Padang, the questionnaire results were obtained in table 2.

Table 2. Calculation Results of Matific Interactive Game Media Effectiveness Questionnaire

No.	Name	Score
1.	IA	80
2.	RA	100
3.	MI	81
4.	MB	71
5.	MA	99
6.	RP	83
7.	GN	85
8.	AW	94
9.	AN	91
10.	FZ	93
11.	FD	92
12.	LH	90
13.	AZ	74
14.	FN	95
15.	ZN	91
16.	MZ	95
17.	BA	76
18.	AD	94
19.	ZA	88
20.	QD	88
21.	MR	92
22.	KD	90
23.	DM	91
24.	ZR	87
25.	OP	86
26.	ZM	87
27.	CL	88
28.	SN	87
29.	SJ	97
Total		2565
Average		88,45

Based on table 2, it can be seen that the total score of the questionnaire is 2565 with an average result of 88.45. The effectiveness of the questionnaire can be calculated using formula (1).

$$P = \frac{F}{N} \times 100\% \quad (1)$$

The desired total student score (N) is 100. Based on the formula above, the percentage result of the effectiveness of the *matific* interactive game media is 88.45%. So that the criteria for the effectiveness of this media to improve the learning outcomes of seventh grade mathematics students on integer material are declared very effective. This is also supported by students' opinions and suggestions on the final sheet of the questionnaire, more than 60% said this game was very fun, easy to understand and in the future they wanted to learn math with *matific* again. Students also commented that the *matific* game media really motivated them in learning math. This is in accordance with the questionnaire percentage results for each statement in table 3.

Table 3. Percentage of Student Questionnaire Results

Statement	Answer (%)			
	4	3	2	1
The game is smooth (no errors) when used.	51,7	31	17,2	0
The game still runs well when used for a long time.	62,1	31	6,9	0
The game is easy to use.	72,4	27,6	0	0
The instructions for using the game provided are clear.	82,8	17,2	0	0
The buttons can function properly.	79,3	13,8	6,9	0
The language used in this media can be understood well.	86,2	13,8	0	0
The animations shown in this game are good	51,7	41,4	6,9	0
The animations shown are interesting.	44,8	48,3	6,9	0
You understand the purpose of this game.	51,7	34,5	13,8	0
The questions focus on integer operations.	69	31	0	0
The questions given are in accordance with the abilities of 7th grade students?	69	27,6	3,4	0
The problems given can increase your understanding of the number operation material.	62,1	31	6,9	0
Does this game increase your desire to learn?	37,9	51,7	10,3	0
The flow of the game can be easily understood	58,6	41,4	0	0
You can interact with this game well.	62,1	34,5	3,4	0
This matific math game makes me more interested in math?	27,6	44,8	27,6	0
This game can increase your motivation to learn math on whole number operations.	27,6	65,5	3,4	3,4
This game can boost your learning spirit.	48,3	51,7	0	0
You want to use this math game more often as a learning tool in class.	51,7	41,4	6,9	0
You feel more enthusiastic in learning math after playing this math game in class.	44,8	44,8	10,3	0
You will find it more fun to learn math through this game than just the conventional learning method.	72,4	27,6	0	0
You are honest when you break the rules during the <i>Matific</i> game.	65,5	34,5	0	0
You like it when your teachers use <i>Matific</i> games in learning.	86,2	13,8	0	0
You want to always use <i>Matific</i> games in learning	65,5	27,6	6,9	0
You feel more able to solve problems with the <i>Matific</i> game than when using conventional methods.	65,5	27,6	6,9	0
Average	59,9	34,2	5,8	0,1

Based on table 3, students are happy when the teacher teaches math using the Matific game media as evidenced by the highest percentage obtained in this statement, namely 86.2% (25 students) on a scale of 4 and 13.8% (5 students) chose scale 3. (Manny-Ikan et al., 2016) who said 79% of students want to continue using *matific*. Students are interested in participating in learning and trying to get the best grades. (Widhayanti & Abduh, 2021). Reinforced by Figure 1, it appears that students are happy when playing matific.



Figure 1. Students' faces while playing Matific

In Table 3, 17 students with a percentage (59.9%) responded very well because they were interested and happy to learn by using Matific, 10 people (34.2%) had a good response to the Matific game, and the rest responded moderately and less. So it can be concluded that out of 29 students with a response of happy, interested, and enthusiastic about learning math with Matific interactive game learning media get more responses ($59.9 + 34.2 = 94.1\%$). This is supported by research conducted by (Afidah & Subekti, 2024) that students respond well to the use of digital educational game applications, such as.

Based on this, almost all students gave an assessment that could be categorized as Very Good / Strongly Agree that there was a learning innovation in the Matific game that they had used. This means that the use of Matific interactive game media can motivate students and increase their interest in learning so that it affects the increase in student learning outcomes. Students are motivated to pay attention to the teacher and encourage students to look for material provided by the teacher in class. (Daryanes & Ririen, 2020). This statement is further reinforced by (Nur, 2022) who said that learning using interactive media can foster student motivation and make it easier for students to understand the material taught by the teacher. Through the *Matific* application that is directly connected to each student's *smartphone* so that what they answer will be immediately recorded by the system, making students feel direct involvement in the system.

According to (Hung et al., 2015) and (Hsieh et al., 2016)(Hung et al., 2015) and (Hsieh et al., 2016), student engagement in *games* incorporated in learning will motivate students to perform active actively learning and processing educational content as well as enhancing the experience, *self-efficacy*, and student satisfaction in learning. In addition, every time after answering a question, *Matific* application immediately shows who is the student who answers the fastest and this means that the *Matific* application provides immediate feedback so that it will increase student motivation. increase student motivation, in line with research (Trajkovik et al., 2018), (Kingsley & Grabner-Hagen, 2015), (Seaborn & Fels, 2015) that there are positive effects on student engagement, motivation, and overall performance through immediate feedback and collaboration. Displaying student points on the screen can motivate students to reach the pinnacle of success, so students will be more diligent in the learning process in order to get better feedback.

Matific as an educational and interactive *game* is a gamification approach that utilizes gaming principles and student response system tools to support student learning, engagement, enjoyment, motivation and attention during the learning process. *Matific* can make learners activate prior knowledge and assess their

performance as they play and learn the content of a subject. play and learn the content of a subject matter. Through educational *games* it can increase students' attention, motivation, engagement and enjoyment compared to traditional methods (Morillas Barrio et al. (Morillas Barrio et al., 2016)&(Wang & Lieberoth, 2016). Through *Matific* App as an educational game also creates student autonomy in learning as students can operate it on their own mobile devices.

This research contributes to the field of education in developing mathematics skills, increasing student engagement, and reducing student anxiety through educational games. Student involvement in the mathematics learning process is related to increased student learning outcomes. In addition, this research investigates the effectiveness of matific in one of the junior high schools in Indonesia. In Indonesia, matific research has never been carried out, especially at SMPN 7 Padang. By utilizing technology, this research supports the learning process of educational units. The obstacle that hinders the use of this media is an unstable internet connection, because *matific* is an online game that requires an internet network. Based on the questionnaire results from 29 students in class VII.2, it can be concluded that the use of interactive game media *matific* has been effective in learning mathematics, especially integers . This is corroborated by research conducted by (Segmeasurement, 2017) who said that *matific* games are effectively used to improve students' math learning outcomes. After learning matific, it is hoped that math is no longer considered a difficult thing. By learning while playing matific makes math fun.

CONCLUSIONS

Based on the results and discussion, the use of the *Matific* application is effective in learning mathematics and is able to improve student learning outcomes in mathematics, especially integer material. *Matific* helps students understand concepts. increase motivation, get excited and make learning math no longer difficult. The games contained in *Matific* are also in accordance with students' daily lives so that they are easy to understand. The use of *Matific* interactive game media is expected to contribute to future math learning activities and this research is useful as a source of reference for those who need it. The obstacle that hinders the use of this media is the unstable internet connection, because *matific* is an online game that requires an internet network.

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LITERATURE

- Afidah, N., & Subekti, fitrianto eko. (2024). Efektivitas Penggunaan Game Edukasi Digital Terhadap Hasil Belajar Matematika Siswa. *Jurnal Basicedu*, 8(3), 1944–1952. <https://journal.uii.ac.id/ajie/article/view/971>
- Agusti, N. M., & Aslam, A. (2022). Efektivitas Media Pembelajaran Aplikasi Wordwall Terhadap Hasil Belajar IPA Siswa Sekolah Dasar. *Jurnal Basicedu*, 6(4), 5794–5800. <https://doi.org/10.31004/basicedu.v6i4.3053>
- Attard, A. C. (2016). *Research Evaluation of Matific Mathematics Learning Resources: Project Report*. <https://researchdirect.westernsydney.edu.au/islandora/object/uws%3A37189/>

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DOI: <https://doi.org/10.31004/basicedu.v8i5.8486>
- Auliya, R. N. (2016). 2016_Auliya. *Jurnal Formatif Jurnal Ilmiah Pendidikan MIPA*, 6(20), 12–22.
- Birbal, R., Mohammed, N., Ramdass, M., & Joseph-alleyne, G. (2023). *Enhancing Mathematical Performance in Primary School Boys: The Role of the Mathific Learning Platform*. 12(2), 32–45. <https://doi.org/10.15640/jehd.v12n2a4>
- Daryanes, F., & Ririen, D. (2020). Efektivitas Penggunaan Aplikasi Kahoot Sebagai Alat Evaluasi pada Mahasiswa. *Journal of Natural Science and Integration*, 3(2), 172. <https://doi.org/10.24014/jnsi.v3i2.9283>
- Hendrawan, G. B., & Marlina, R. (2022). Persepsi Siswa Terhadap Penggunaan Game Edukasi Digital Pada Pembelajaran Matematika. *JPMI (Jurnal Pembelajaran Matematika Inovatif)*, 5(2), 395. <https://doi.org/10.22460/jpmi.v5i2.10288>
- Hsieh, Y.-H., Lin, Y.-C., & Hou, H.-T. (2016). Exploring The Role Of Flow Experience, Learning Performance And Potential Behavior Clusters In Elementary Students' Game-Based Learning. *Interactive Learning Enviroment*, 24(1), 178–193.
- Hung, C.-Y., Sun, J. C.-Y., & Yu, P.-T. (2015). Exploring The Role Of Flow Experience, Learning Performance And Potential Behavior Clusters In Elementary Students' Game-Based Learning. *Interactive*, 172–190.
- Kingsley, T. L., & Grabner-Hagen, M. M. (2015). Gamification: Questing to integrate content knowledge, literacy, and 21st-century learning. *Journal of Adolescent and Adult Literacy*, 59(1), 51–61. <https://doi.org/10.1002/jaal.426>
- Manny-Ikan, Berger-Tikochinski, T., & Marmor, A. (2016). *Research Evaluation of "Mathific "*. Henrietta Szold Institute.
- Morillas Barrio, C., Munoz-Organero, M., & Sanchez Soriano, J. (2016). Can Gamification Improve the Benefits of Student Response Systems in Learning? An Experimental Study. *IEEE Transactions on Emerging Topics in Computing*, 4(3), 429–438. <https://doi.org/10.1109/TETC.2015.2497459>
- Nur, Y. (2022). Efektivitas Penggunaan Media Interaktif Berbasis Powerpoint pada Pembelajaran Tatap Muka Terbatas di Sekolah Dasar. *Jurnal Basicedu*, 6(4), 6190–6196. <https://jbasic.org/index.php/basicedu>
- Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human Computer Studies*, 74(February 2015), 14–31. <https://doi.org/10.1016/j.ijhcs.2014.09.006>
- Segmeasurement. (2017). *An Evaluation Of Matific Use In Grades Two And Three*.
- Sudjana, N. (2002). *Penilaian Hasil Belajar Mengajar*. Remaja Rosdakarya.
- Trajkovic, V., Malinovski, T., Vasileva-Stojanovska, T., & Vasileva, M. (2018). Traditional games in elementary school: Relationships of student's personality traits, motivation and experience with learning outcomes. *PLoS ONE*, 13(8), 1–15. <https://doi.org/10.1371/journal.pone.0202172>
- Wang, A. I., & Lieberoth, A. (2016). The effect of points and audio on concentration, engagement, enjoyment, learning, motivation, and classroom dynamics using kahoot! *Proceedings of the European Conference on Games-Based Learning, 2016-January*(October), 738–746.
- Widhayanti, A., & Abduh, M. (2021). Penggunaan Media Audiovisual Berbantu Power Point Untuk Meningkatkan Hasil Belajar Peserta Didik di Sekolah Dasar. *Jurnal Basicedu*, 5(3), 1652–1657. <https://jbasic.org/index.php/basicedu/article/view/975>
- Wiwien, K., & Restu, W. (2019). Efektivitas media game mengetik interaktif berbasis adobe flash cs5 terhadap motivasi belajar siswa. *Jurnal Teknologi Pendidikan*, 3(April 2018), 1–10.