Bamboozle: Technology-Based Educational Games to Increase Motivation and Mathematics Learning Results

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Abstract
Mathematics is one of the subjects that is considered difficult for students. This is a challenge for educators to use cool and enjoyable learning media in learning, one of which is bamboozle media. The aim of this research is to determine the effectiveness of bamboozle as an evaluation medium and to increase students' interest in learning mathematics. The method used is quantitative with a one group pretest-posttest research design. Meanwhile, the sample in this study used a saturated sample, meaning that the existing population was used as the overall sample. The samples from this research were 33 class IV students at MI Soko, Pekalongan City. Data collection was carried out by giving questionnaires and questions about the mathematics of division and multiplication. After that, researchers analyzed the data using the N-gain test, hypothesis test, and Likert scale. The results of this research are: (1) Students' learning motivation using bamboozle edugames is classified as effective with a score of 80.7%. (2) The use of bamboozle as a medium in improving student learning outcomes is said to be effective with an N-gain value of 0.35, included in the medium category and hypothesis testing with a significance value of 0.000 <0.05 which proves that there is a significant difference between the pretest and posttest results.

Keywords: Bamboozle, learning outcomes, motivation, mathematics learning

A. Introduction

Technology is something that we cannot avoid in this digital era. This is because technological developments are very rapid and have various impacts on human life, one of which is in the field of education (Muslimin & Ivone, 2024). Through the use of technology in the field of education, it will of course produce interesting and interactive media for students (Rahmayanti & Abidin, 2023). Interactive media is a digital-based media that conveys information to students through images, animation, video, and audio (Novita et al., 2019). So educators must be technologically literate to be able to keep pace and prepare students to welcome this century.

One of the impacts of implementing the independent curriculum is the liberation of media that educators can use in the teaching and learning process. Educators

have the right to use teaching resources, teaching media, and teaching materials, as well as any evaluation in their implementation (Rahmayanti & Abidin, 2023). This aims to ensure that students do not feel bored with monotonous and old-fashioned learning. Educational games are an example of the use of technology in learning. Through this media, students become interested and can increase their interest, and concentration and solve problems (Mardhotillah & Rakimahwati, 2021). Because psychologically, humans prefer to play rather than be serious, the use of educational games is deemed appropriate to reduce boredom and can also have an impact on the way of thinking and other aspects (Zalillah & Alfurqan, 2022). One of the educational games that can be used in this era is Bamboozle.

Bamboozle is a web-based educational game that educators can use when providing evaluations to their students. These educational games are similar to digital-based intelligence which is interesting and fun (Andriyani et al., 2021). Apart from that, some features make students even more enthusiastic, such as the add point feature, subtract point feature, and even the rocket feature which makes the group come first. The level of enthusiasm and interest of students in learning will certainly have an impact on their learning outcomes (Setyawan & Panduwinata, 2023).

(Puspita & Syahria, 2023), the use of Bamboozle makes students comfortable, does not get bored, challenges them, and makes learning easier. In line with research conducted (Alimova, 2023) bamboozle can increase participants' motivation and understanding in English lessons. (Sulistyowati & Suteki, 2023) also argue that using bamboozles can improve students' cognitive abilities. Therefore, researchers want to study further the use of bamboozles in the learning process to improve learning outcomes and student interest. The novelty of this research is the material used. Previous research focused on learning English, while this research focused on mathematics lessons, especially multiplication and division. The method used in this research is quantitative with a one-group pretest-posttest design. Meanwhile, the sample in this study used a saturated sample of 33 class IV students at MI Soko, Pekalongan City.

B. Discussion

Using bamboozle to increase learning motivation

Learning motivation is one of the factors that influences student learning outcomes. According to Hamzah, learning motivation is an internal or external encouragement that makes students change their behavior (Hamzah, 2013). Motivation can also be said to be the effort a person makes to achieve certain goals (Hamdu & Agustina, 2011). Students who have high motivation will certainly have high enthusiasm in the learning process (Handhika, 2012) motivation). So learning motivation can have a significant impact on the learning process which will later lead to learning outcomes.

Students' learning motivation in mathematics lessons is relatively low. Several factors trigger this such as; the difficulty of the material, the media used by

educators, and the stigma of students regarding boring mathematics. (Novianti et al., 2020) . So it is necessary to conduct further research on student motivation in mathematics lessons using bamoboozle. The following are the results of a questionnaire regarding students' learning motivation in mathematics.

Tabel 1. Conversion of validation sheet scores for using bamboozle

Intervals	Percent	Category
3,26-4	82-100	Very Effective
2,51-3,25	64-81	Effective
1,76 -2,5	44-63	Ineffective
1 - 1,75	<44	Very ineffective

Tabel 2. . Student motivation in mathematics lessons with bamboozle

Statement	Mean	%	Category
Are you happy with learning using Bamboozle media?	3,48	86,90	Very Effective
By working on the questions using Bamboozle media, I didn't experience any difficulties	3,19	79,80	Effective
I enjoy answering questions using Bamboozle media to increase my knowledge	3,43	85,70	Very Effective
I am excited to work on questions using Bamboozle media	3,38	84,50	Very Effective
Media Bamboozle helped me to do the questions correctly	3,43	85,70	Very Effective
The use of Bamboozle media is very interesting in working on questions	3,38	84,50	Very Effective
Bamboozle media can make it easier for me to ask questions	3,00	75,00	Effective
I found it difficult when working on questions using Bamboozle	2,76	69,00	Effective
I like the appearance of each question in Bamboozle media	3,05	76,20	Effective
By using Bamboozle media, I am fast in working on questions	3,19	79,80	Effective
Mean Total	**3,23**	**80,7**	Effective

Based on the results above, it can be concluded that bamboozle is effective as a medium for evaluating mathematics learning. This is because the average value of the questionnaire distribution is 80.7 %, including the effective category in Table 1.

Effectiveness of using Bamboozle in improving learning outcomes

Bamboozle is a fun technology-based educational game (Aeni et al., 2023). There are various bamboozle features in the form of games and education so that students can understand the material better. The use of bamboozle can also be used as an interesting and interactive evaluation medium (Sulistyowati & Suteki, 2023). Educators and students can access Bamboozle on the website https://www.bamboozle.com/

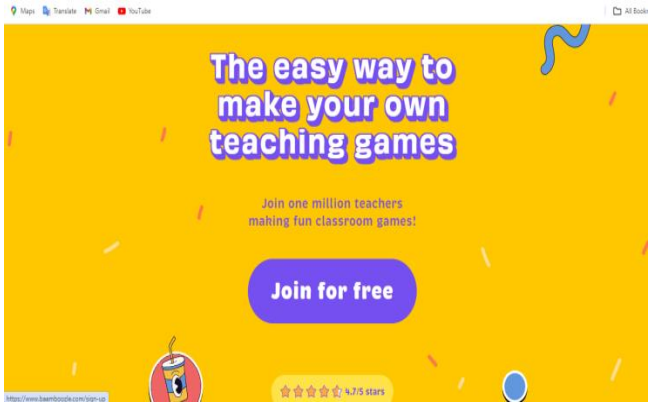

Figure 1. Bamboozle appearance

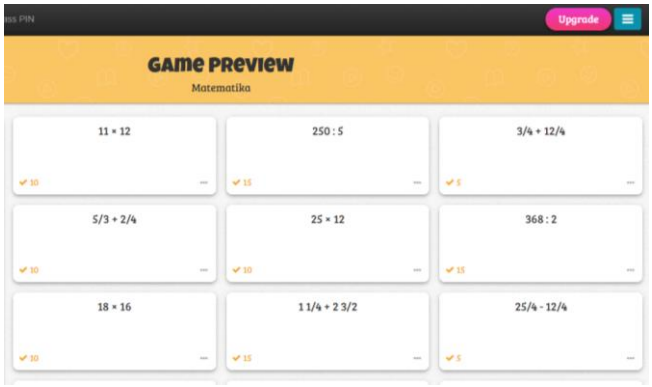

Figure 2. Display of mathematics problems

To find out how effective the use of bamboozles is in learning mathematics, researchers carried out N-gain and hypothesis testing. The data collection process uses pretest and posttest questions. The material provided is multiplication and division which consists of 20 multiple-choice questions and is presented with interesting features provided by bamboozle.

$$\text{N} - \text{Gain} = \frac{skor\ posttest - skor\ pretest}{skor\ ideal - skor\ pretest}$$

Table 3. N-gain value category

N-Gain Score	Kategori
g > 0,7	Tall
0,3 ≤gram ≤0,7	Currently
g < 0,3	Law

Table 4 . Pretest-posttest N-gain value of learning outcomes math with bamboozle

Pretest	posttest	selisih	N-gain	Category
55	75	45	0,44	currently
65	75	35	0,29	low
60	75	40	0,38	currently
70	70	30	0,00	low
75	80	25	0,20	low
50	60	50	0,20	low
70	80	30	0,33	currently
75	85	25	0,40	currently
50	65	50	0,30	currently
85	90	15	0,33	currently
75	90	25	0,60	currently
50	60	50	0,20	low
80	90	20	0,50	currently
90	95	10	0,50	currently
50	55	50	0,10	low
80	95	20	0,75	high
45	60	55	0,27	low
80	95	20	0,75	high
75	85	25	0,40	currently
60	75	40	0,38	currently
55	65	45	0,22	low
80	95	20	0,75	high
65	70	35	0,14	low
70	75	30	0,17	currently
70	75	30	0,17	low
55	60	45	0,11	low
65	75	35	0,29	low
60	70	40	0,25	low
90	100	10	1,00	high
70	80	30	0,33	currently
75	85	25	0,40	currently

65	70	35	0,14	low
70	80	30	0,33	currently
Mean			**0,35**	**currently**

Based on data calculations, the N-gain result is 0.35, which is included in the medium category. This means that the use of bamboozles can be said to be able to improve student learning outcomes. Research conducted by (Setyawan & Panduwinata, 2023) shows that the use of bamboozle can improve student learning outcomes with sig. 0.000 < 0.05. Apart from that, researchers also tested the normality of the data as shown in the following table.

Table 5. Normality Test

	Shapiro-Wilk			
Result	Statistic	df	Sig.	
Pretest	,200*	,963	33	,323
Posttest	,200*	,960	33	,250

Based on the table above, it is known that the pretest value with sig. 0.323 and posttest value 0.250. The basis for decision-making in the normality test is said to be normal if the sig value is > 0.05. So it can be concluded that the data above is normally distributed because the pretest and posttest significance values are more than 0.05 (Ramadhani & Bina, 2021).

Table 6. Hypothesis Testing

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Pretest & Posttest	33	,933	,000

Based on the table above, the sig value (0.000) is smaller than 0.05 (Sig < 0.05), meaning that H_0 is rejected and H_a is accepted (Sugiyono, 2019). So it can be concluded that using bamboozle can improve mathematics learning outcomes.

C. Conclusion

The use of bamboozle as a learning medium has been proven to be able to improve mathematics learning outcomes with an N-gain of 0.35 and a hypothesis result of 0.000 < 0.05, which indicates that H0 is rejected and Haa is accepted. Apart from that, bamboozle can also increase students' motivation, especially in mathematics lessons which are known to be difficult and boring. Researchers hope that this research will become a reference for future researchers. Further research could also develop the use of bamboozles in other lessons. The researcher would like to thank the head of MI Soko who agreed to use it as a research site and all his staff.

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