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DEVELOPMENT OF *BAMBOOZLE* LEARNING MEDIA BASED ON A TEAM GAME TOURNAMENT TO INCREASE STUDENT LEARNING MOTIVATION

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ABSTRACT

Encouraging student motivation requires a supportive classroom learning atmosphere. This study addresses this challenge in mathematics education by developing learning media called *Bamboozle*. *Bamboozle* is an online-based learning platform. It was played in tournament mode and employs a keypad as quizzes. This research was integrated *Bamboozle* into a cooperative learning model—Team Game Tournament (TGT)—and applied to Grade VIII MTsN 1 Medan, focusing on the topic of relations and functions. This study used the 4-D model. First, identified the needs (**Define**), made media draft (**Design**), improved with expert help (**Develop**), and tested in a small trial (**Disseminate**). The results indicate that the media achieved valid scores in terms of content (3,95), construct (3,91), and media itself (3,92). The increase in students' motivation, from 51.83 to 71.9, falls within the medium category based on the N-gain analysis and percentage of positive response above 95% for almost all indicators, indicating its effectiveness. Additionally, the media was found to be practical, with students and teachers reporting ease of use and suitability with class time. These findings suggest that *Bamboozle* has the potential to enhance student motivation in learning mathematics, particularly when appropriate classroom preparation is ensured.

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1. INTRODUCTION

A conducive learning environment is essential for successful education. According to Musfah (Musfah, 2015), there are three main aspects that should be considered in education: self-awareness in learning, a supportive classroom atmosphere, and the development of students' skills and character. This study is motivated by the second aspect, which emphasizes the importance of a supportive learning atmosphere. In the current digital era, creating such an environment poses new challenges, particularly in mathematics education. Teachers are required to stay updated with innovative learning media that can simultaneously foster a supportive learning environment and enhance student engagement.

Recent research has emphasized the importance of the learning environment in shaping students' outcomes and experiences. In particular, Regidor (Regidor et al., 2024)found a moderate positive correlation between students' learning motivation and the presence of a nurturing learning environment. This means that when students perceive their learning environment as supportive and encouraging, they tend to grow, and their motivation to engage in class and tasks increases. This study addresses the importance of preparing and implementing a supportive environment that not only fulfills academic instruction but also brings emotional health, a sense of inclusion, and strong connections between students and teachers. A key driver of student achievement and persistence is motivation so understanding the students' environment can lead us to have a better policy and rule that can enhance students' outcomes.

Specifically in mathematics, student motivation is a significant concern. According to the Ministry of National Education (Depdiknas), students are considered motivated in learning mathematics when at least 75% of them meet the motivation indicators(Waskhudin, 2016). However, observations from our preliminary study reveal a discrepancy between theory and practice. Among 31 students, 51.42% reported disliking mathematics, 21.41% liked it slightly, and only 17.14% expressed a clear interest in the subject. This finding showed that a significant number of students have a negative attitude toward mathematics as a lesson, suggesting a need to explore the reason behind this students' perceptions.

One contributing factor to this issue is the limited use of engaging learning media. Cahyadi (Cahyadi, 2019) emphasized that media plays a crucial role in clarifying learning content and overcoming common classroom limitations such as time, space, and sensory engagement. Suggesting that a supportive learning environment needs to have a learning media that can solve at least one of the three limitations. Responding to this challenge, this study introduces *Bamboozle*, a game-based learning platform that can be integrated into various subjects, including mathematics. *Bamboozle* game is founded by Ronan Casey. This game is characterized by its low technological requirements, minimal preparation time, and emphasis on engaging, play-based learning. The friendliness of this game made it particularly suitable for the topic of relations and functions in Grade VIII of senior high school relations and functions.

Our preliminary study reveals a misconception between relation and function happened in students. Specifically, students often struggle to distinguish the key characteristics between relations and functions, particularly when pairing inputs and outputs based on given instructions, leading to confusion in identifying whether a relation qualifies as a function. A function not only showed the relation between input and output but it also must be paired with exactly one output. While both relations and functions involved sets of pairs, students frequently misunderstand this important distinction. As a

result, they may incorrectly distinguish a relation as a function or vice versa. This confusion indicates a gap in their conceptual understanding, suggesting the need for clearer examples and practice. This finding made *Bamboozle* a good choice for practicing and enhancing students' understanding and motivation in relation and function.

Bamboozle in the implementation is compatible with the cooperative learning model known as Team Game Tournament (TGT). TGT has five steps including class preparation, team, game, tournament, and team recognition. Sundari (Sundari et al., 2023) describe TGT as an engaging model that ends with a game-based competition, promotes peer tutoring, and provides reinforcement through fun activities. *Bamboozle* played from one screen and no device was needed. It can be played online or offline depending on the study environment. It's ideal for reviewing or practicing a lesson such as relation and function. The way it played in teams and tournaments made it suitable to be played with TGT models. *Bamboozle* lets students arrange a good strategy, knowledge, and attitude during the process. In each question that is solved, students get a point or a secret move to take down the opponent.

Khoiro (Khoiro et al., 2023) and Hoang (Hoang et al., 2023) reported that *Bamboozle* significantly enhances students' interest and enjoyment in the learning process. The game's competitive format fosters a sense of engagement, motivating students to contribute actively to their team's performance. The in-class competition promotes both academic outcomes and student motivation, as learners are driven to strategize and strive for the highest possible scores. Furthermore, the game facilitates learning in an enjoyable and interactive manner, often leading students to absorb material effectively without being fully conscious of the learning process itself.

However, other researchers have highlighted potential drawbacks of gamification. Ratinho and Martins (Ratinho & Martins, 2023)noted that its long-term motivational effects might decline, and Smiderle (Smiderle et al., 2020)stressed that outcomes are highly dependent on learners' characteristics. These findings highlight a deviation from the initial expectations outlined in the research hypothesis. This research aims to address these conflicting findings by developing and evaluating the implementation of *Bamboozle* integrated with the TGT model in mathematics learning, specifically for the topic of relations and functions.

2. METHOD

The research method in this research is 4-D by Thiagarajan (Thiagarajan et al., 1974)consisting of four stages: Define, Design, Develop, and Disseminate. According to Mesra et al. (2013), the **Define** stage identifies learning needs through front-end, learner, task, and concept analyses, along with specifying instructional objectives. The **Design** stage involves developing an initial product through test construction, media selection, format determination, and prototype creation. The **Develop** stage includes expert validation and field trials. Finally, the **Disseminate** stage focuses on distributing the finalized product. The research design scheme applied in this study is as follows.

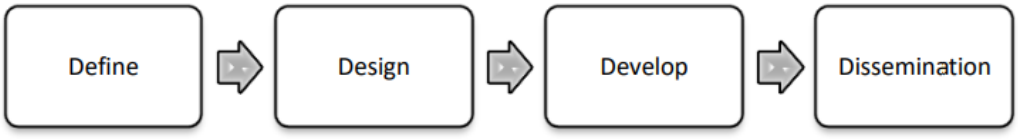

Figure 1. *Flowchart* model 4-D (Johan, *et al*., 2023)

The purpose of this research is to develop a game-based learning media using Bamboozle, integrated with the Team Game Tournament (TGT) cooperative model, aimed at increasing students' motivation in learning mathematics—specifically in the topic of relations and functions for Grade VIII students at MTsN 1 Medan.

The validity of the learning media was assessed through expert validation, including content experts, construct experts, and media experts. Content validation sheets measured aspects such as content accuracy, language, presentation, and graphics. Construct validation sheets measured aspects such as the interconnectedness of all components is described consistently and the interconnectedness of all components is described consistently. Whereas media validation measured aspects such as program performance, media systematics, media aesthetics, animation quality, media design principles, interactivity, media design and facilities, pedagogical effects, and ease of use. The instrument used was adapted from Budi Halomoan Siregar (Siregar, 2024)and rated using a Likert scale.

Table 1. Criteria for validity score (Sugiyono, 2016)

Category	Score
Highly feasible	4
Feasible	3
Less feasible	2
Not feasible	1

The effectiveness of the media was evaluated through a pre-test and post-test design to measure student motivation and student response questionnaire were administered to assess students' learning motivation and perceptions toward the media. The motivation instrument was adapted from motivation indicators proposed by Uno (Uno, 2014), which include: a desire to achieve academic success; intrinsic drive and need for learning; future-oriented hopes and aspirations; appreciation of the learning process; engagement in stimulating learning activities; and a supportive learning environment conducive to effective learning. All collected data were analyzed using descriptive statistics and N-Gain analysis to examine the improvement in students' motivation.

According Lestari and Muhammad (Lestari & Yudhanegara, 2015) the normalized gain is calculated by the following formula:

$$N - Gain = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}}$$

Description:
N - $Gain$ = the normalized gain score
$Spost$ = the final test score
$Spre$ = the initial test score
$Smax$ = the maximum score

The categories of normalized gain, as defined by Lestari and Muhammad, are presented in the table 2.

Table 2. Normalized Gain Categories

Category	Criteria
N-gain $\geq 0{,}70$	High
$0{,}30 < \text{N} - \text{gain} < 0{,}70$	Medium
N-gain $\leq 0{,}30$	Low

The determination of the average student response score (Rs) follows these steps:

$$\%\ response\ to\ each\ aspect = \frac{Number\ of\ students\ giving\ a\ response}{Total\ number} \times 100\%$$

The achievement of learning objectives based on student responses is considered met if at least 80% of participants provide a positive response in each trial. The practicality of the media was measured through a practicality questionnaire completed by both teachers and students, focusing on ease of use, time efficiency, and applicability in real classroom settings. Practicality questionnaire analysis using the formula (Riduwan, 2015).

$$P = \frac{TS_e}{TS_h} \times 100\%$$

Descript :
P = Persentase Kepraktisan
TSe = Total Skor Empiris
TSh = Total Skor Penuh

Furthermore, this practicality value is referred to the interval for determining the level of practicality of learning media in the table 3.

Table 3. Practicality Categories

Practicality Percentage	Criteria
81% - 100%	Very Practical
61% - 80%	Practical
41% - 60%	Practical Enough
21% - 40%	Not Practical
0% - 20%	Very Not Enough

The study involved 31 students from class VIII A MTsN 1 Medan as research participants. Validators included two subject matter experts and one media expert. Data collection instruments were validated prior to use to ensure validity.

3. RESULTS AND DISCUSSION

3.1. Results

The Results of this research are described in three aspects: validity, effectiveness, and practicality of the developed *Bamboozle*-based learning media.

a. Validity of The Learning Media

The learning media was evaluated by expert lecturers in terms of content, construct, and overall media quality. The validation scores are shown in Table 4.

Table 4. Expert Validation Results

Expert Validation	Mean Score	Category
Content validation	3.95	Valid
Construct validation	3.91	Valid
Media validation	3.92	Valid

These results indicate that the developed media meets the validity standards in content relevance, instructional construct, and media quality.

b. Effectiveness of the Learning Media

Effectiveness was measured using a pre-test and post-test on students' motivation in learning mathematics (relation and function topic) as well as a student response questionnaire. As shown in table 5, there was an increase in students' motivation scores after the intervention.

Table 5. Pre-test and Post-test Results of Learning Motivation

Test	Mean	Category
Pre-test	51,83	Average
Post-test	71,9	Above average

A normality test was conducted on the gain scores. The result is shown in Table 6.

Table 6. The outcome of the normalized N-gain analysis

Pre-test	Post-test	Gain Normality
51,83	71,9	0,41

Since the N-gain score is 0,41 indicating that the learning activity had medium degree of improvement in motivation between the pre-test and post-test scores. Additionally, a student response questionnaire consisting of 15 statements was given after the lesson using *Bamboozle*.

Table 7. Analysis of Student Responses per Indicator

Indicator	Percentage
Preference and enjoyment of using learning media	97.58%
Motivation to follow the learning process	98.92%
Motivation to understand concepts	96.77%
Effect of visual and interactive elements	96.77%
Rewards and feedback	100%
Interest in continuing to use the media	100%
Satisfaction with information presentation	93.55%
Interest in media-based evaluation	96.77%

These findings indicate that the respondents demonstrated a very high level of acceptance and motivation toward the use of Bamboozle as a learning medium, with positive response rates exceeding 95% across nearly all indicators. This suggests that the developed media is highly effective in enhancing student engagement and learning motivation.

c. Practicality of the Learning Media

Practicality was assessed through a questionnaire measuring three aspects: usability, ease of use, and time efficiency. The results are presented in Table 8.

Table 8. Practicality Evaluation of The Learning Media

Aspect	Average Score	Percentage	Category
Usable	4.26	85.24%	Very Practical
Easy to Use	4.19	83.87%	Very Practical
Time	4.25	84.84%	Very Practical

These results suggest that the Bamboozle-based learning media is practical to be used in classroom settings and can be implemented effectively within typical lesson durations.

3.2. Discussion

The results of this study indicate that the *Bamboozle*-based learning media developed is valid in terms of content, construct, and media quality. According to Anderson as cited in Arikunto(Arikunto, 2018) a test is considered valid if it measures what it intends to measure. With an average expert validation score of 3.92, the developed media meets the required criteria for classroom application. However, expert lecturers also suggest several improvements are still needed, such as the completeness of instrument elements, correction of spelling and writing errors, and media viewability. In terms of media viewability, the expert recommended providing a printed version of the media to accommodate students who may have difficulty viewing the screen or projector.

The following figure presents the developed media, which has been revised in accordance with the expert's recommendations, followed by step-by-step guidance on its implementation in the classroom using the Team Games Tournament (TGT) cooperative learning method. First, teacher set up **class preparation** whereas teacher deliver lesson relation and function to students. Second, **team** was made into several groups. In this research we devide 31 students into 5 groups named in unique ways as student request such as Spiderman, Batman, Ultraman, Avenger and Wonderwoman.

Futhermore, in the third step, **game** was prepared by simply make a count and join at https://www.bamboozle.com/sign-up. Games that we created can be found using a range of filters (see Figure 2) with topic relation and functions.

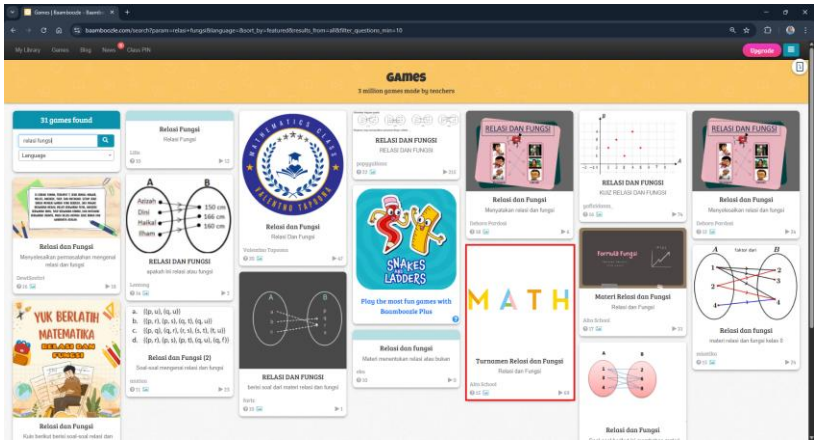

Figure 2. *Search Filters*

Teachers choose the game that already created before. In this term, we choose relation and function tournament. By clicking the red box, teacher directly can see the preview question of this tournament showing in figure 3.

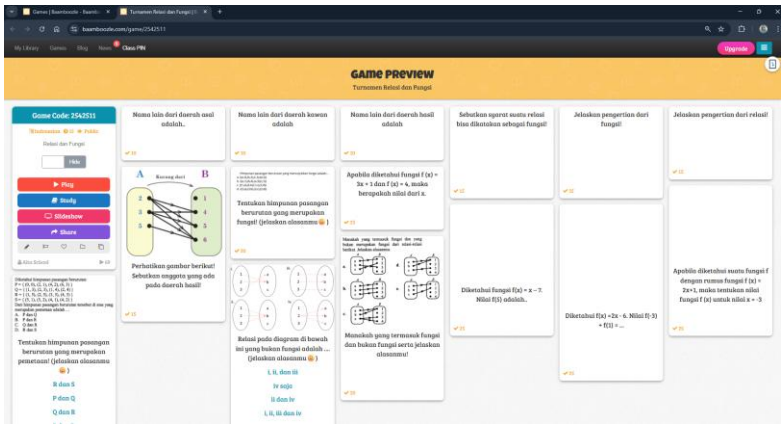

Figure 3. *Game Preview*

In this game preview teachers can see the question and points in each questions. After a short review, teachers can directly click “play” button in the left side and choose the type of game in *Bamboozle*. *Bamboozle* itself also give the users how to play instruction that shown in figure 4.

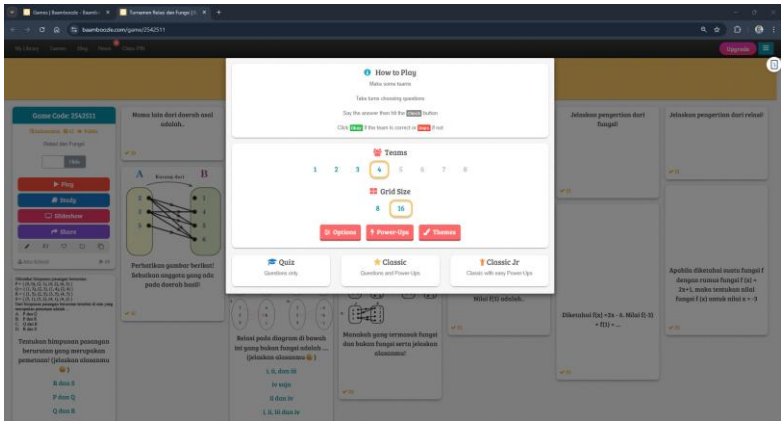

Figure 4. *How to Play Instruction*

The "How to Play" instructions page allows teachers to customize various aspects of the tournament, including the number of participating teams and the number of questions presented in each set. Additionally, teachers can modify game elements such as power-ups and the overall theme of the tournament. Once the settings are configured, selecting the "Classic Mode" option will generate a preview of the tournament interface, as illustrated in Figure 5.

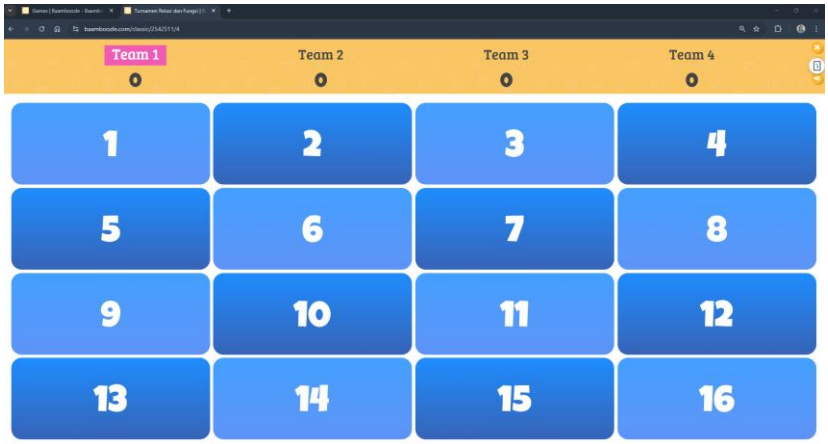

Figure 5. *Game Board*

In this session according to TGT implementation, the four step that is the **tournament** step begun. Students and their own team take turns choosing boxes that contain problems and exercises about relations and functions. each box not only consists of questions but can also be traps or interesting choices to be able to defeat animals and get as many points as possible at this stage, students' strategies and skills are encouraged. After all the boxes have been selected, the student with the highest score will be the winner. The winner will get a **recognition** as shown in figure 6.

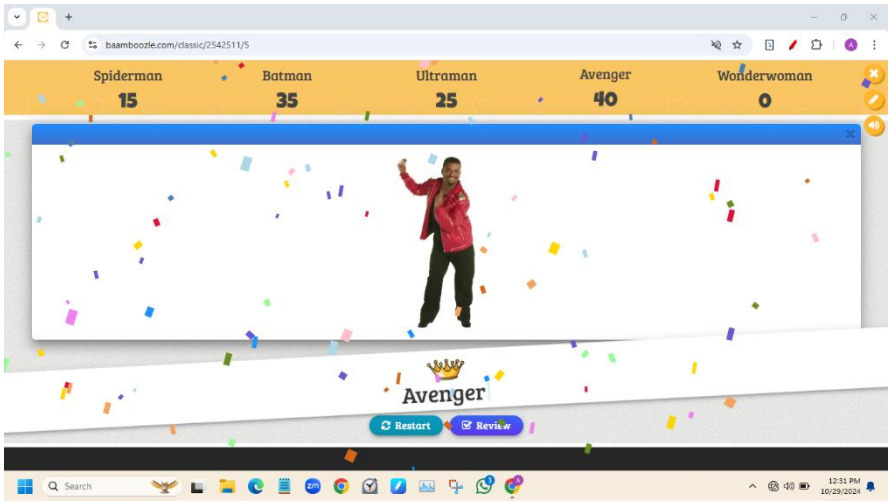

Figure 6. *The Winner of the Relation and Function Tournament*

Furthermore, the effectiveness of the media was assessed through a pre-test and post-test on students' motivation. The gain score indicates a medium improvement, this suggests t that the learning media had a moderate yet meaningful impact on enhancing

students' understanding of the material. Futhermore, the importance of preparing classroom conditions prior to implementing the game-based media need to be taken into consideration. These include students' familiarity with the game procedures, the formation of groups, and the availability of supporting infrastructure such as internet access and devices. These findings are in line with Smiderle (Smiderle et al., 2020),who emphasized that the impact of gamification depends heavily on user characteristics and environmental factors.

The student response data further support the effectiveness of the media. A high agreement rate exceeding 95% across the questionnaire items indicates that students showed strong engagement and positive perceptions toward the learning experience. As noted by Mulyasa (Mulyasa, 2016) suggests that effective learning occurs when students are at least 80% actively engaged physically, mentally, and socially, which appears to have been achieved in this implementation. This finding showed that the learning media get a positive response from students during the session in class.

In terms of practicality, the learning media received high ratings in usability, ease of use, and time efficiency. Akker (Akker et al., 2010)defines practicality as the degree to which users perceive an intervention as feasible and implementable under normal conditions. According to students and math teacher, the findings from this study suggest that *Bamboozle* is a practical tool for classroom instruction, as reflected by consistently high ratings across all three dimensions.

Dissemination of the media was conducted on a limited scale among mathematics teachers at the research site. Although this stage was not extensive, initial feedback indicated interest and potential for broader adoption. In particular, the teacher noticed students' excessive interest in the teaching and learning process using this *Bamboozle*. Future studies may consider involving more teachers from diverse educational settings to validate the media's scalability and generalizability.

4. CONCLUSION

Based on the findings, it can be concluded that the development of *Bamboozle* as a game-based learning media in the mathematics sub-topic of relations and functions for class VIII A at MTsN 1 Medan meets the criteria of validity, effectiveness, and practicality. The media was validated by experts with an average score of 3.92, indicating strong content, construct, and media validity. Student motivation showed an increase from a pre-test score of 51.83 to a post-test score of 71.9, while student response questionnaires yielded a high agreement rate exceeding 95% for nearlyu all indicators, demonstrating positive reception.

Although the effectiveness level was categorized as medium improvement, this limitation is likely influenced by contextual classroom challenges, including students' unfamiliarity with the procedure of the game implementation, group management, and technical issues such as internet and electricity availability.

Therefore, it is recommended that future implementations ensure adequate preparation of classroom infrastructure and orientation for both teachers and students. Further research may also explore the application of *Bamboozle* in other mathematical topics or at different educational levels to evaluate its scalability and impact on long-term learning outcomes.

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REFERENCES

Akker, J. van den, Kelly, A. E., Nieveen, N., & Plomp, T. (2010). *An Introduction to Educational Design Research SLO • Netherlands institute for curriculum development* (N. N. Tjeerd Plomp, Ed.; 3rd ed.). Netzodruk. www.slo.nl

Cahyadi, A. (2019). *Pengembangan Media dan Sumber Belajar: Teori dan Prosedur*.

Hoang, B. M., Nguyen, T. T. H., & Ngo, T. B. N. (2023). Using Baamboozle To Improve Non-Major Students' Vocabulary Retention. *IOSR Journal of Research & Method in Education*, *13*(4), 24–28. https://doi.org/10.9790/7388-1304022428

Khoiro, D. M., Samsiah, A., & Kegiatan, A. (2023). *Penerapan Media Pembelajaran Bamboozle dalam Meningkatkan Motivasi Belajar pada Siswa Kelas X di SMAN 1 Pamarayan*.

Lestari, K. E., & Yudhanegara, M. R. (2015). *Penelitian Pendidikan Matematika*. Refika Aditama.

Mulyasa, E. (2016). *Pengembangan dan implementasi kurikulum 2013*. Remaja Rosdakarya Offset.

Musfah, J. (2015). *Manajemen pendidikan. : Teori, kebijakan, dan praktik*. Kencana.

Ratinho, E., & Martins, C. (2023). The role of gamified learning strategies in student's motivation in high school and higher education: A systematic review. In *Heliyon* (Vol. 9, Issue 8, pp. 1–16). Elsevier Ltd. https://doi.org/10.1016/j.heliyon.2023.e19033

Regidor, A. R., Vesmanos, A. T., & Deguito, P. O. (2024). The Impact of Supportive Learning Environment on Student Learning Motivation of Senior High School Students. *Asian Journal of Education and Social Studies*, *50*(7), 558–571. https://doi.org/10.9734/ajess/2024/v50i71487

Riduwan. (2015). *Skala Pengukuran Variabel-variabel Penelitian*. Alfabeta.

Siregar, B. H. (2024). *Invensi Hypothetical Learning Trajectory (HLT) melalui Pendekatan Pembelajaran TERPADU Terintegrasi dengan Budaya Melayu Deli dan Multimedia untuk Meningkatkan Kemampuan Berpikir Matematika Tingkat Tinggi Siswa*. Universitas Negeri Medan.

Smiderle, R., Rigo, S. J., Marques, L. B., Peçanha de Miranda Coelho, J. A., & Jaques, P. A. (2020). The impact of gamification on students' learning, engagement and behavior based on their personality traits. *Smart Learning Environments*, *7*(1), 1–11. https://doi.org/10.1186/s40561-019-0098-x

Sugiyono. (2016). *Metode Penelitian Kuantitatif, Kualitatif dan RnD*. Alfabeta.

Arikunto, S. (2018). *Dasar-Dasar Evaluasi Pendidikan Edisi* . Bumi Aksara.

Sundari, E., Khairuddin, K., & Jumadil, J. (2023). Penerapan Model Pembelajaran Kooperatif Tipe Team Games Tournament (TGT) terhadap Minat Belajar Peserta Didik. *Educatoria : Jurnal Ilmiah Ilmu Pendidikan*, *3*(4), 242–247. https://doi.org/10.36312/educatoria.v3i4.218

Thiagarajan, S., Semmel, D. S., & Semmel, M. I. (1974). *Instructional Development for Training Teachers of Exceptional Children: A sourcebook*. Indiana University.

Uno, H. B. (2014). *Teori Motivasi dan Pengukurannya: Analisis di Bidang Pendidikan*. Bumi Aksara.

Waskhudin. (2016). PENERAPAN STRATEGI TANDUR SEBAGAI UPAYA MENINGKATKAN MOTIVASI BELAJAR MATEMATIKA. *Jurnal Inovasi Pembelajaran Karakter*, 1–6.