



Needs Analysis for Game-Based Learning Integration: Developing Blooket Media for Teaching Matter and Its Changes in Junior High School

Putri Rahma^{1*}, M. Hidayat², Erlida Amnie³

^{1,2,3}Fakultas Keguruan dan Ilmu Pendidikan, Pendidikan Fisika, Universitas Jambi, Jambi, Indonesia

Email: putriahmaa38@email.com, m.hidayat@unja.ac.id, erlidaamnie@unja.ac.id

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Abstract

Background: Junior high school students often struggle with the abstract concepts of physics, particularly in the topic of Matter and Its Changes. This study aims to analyze the need for integrating Blooket, a game-based learning platform, to address these learning difficulties. **Methods:** A mixed-methods approach was employed, combining semi-structured interviews with two science teachers and a needs assessment questionnaire administered to 26 eighth-grade students at Adhyaksa 1 Junior High School in Jambi. Qualitative data were analyzed thematically, while quantitative data were processed descriptively. **Results:** The findings indicate that 88.5% of students experience difficulties in learning physics, with 61.5% identifying Matter and Its Changes as the most challenging topic. Key contributing factors included abstract material (30.8%), unclear explanations (38.5%), and lack of real-life examples (26.9%). Conversely, student interest in game-based learning was very high: 92.3% expressed interest in using Blooket, and 57.7% believed educational games enhance learning activity. Teacher support and high digital device accessibility (96.2%) further support its feasibility. **Conclusion:** There is a strong need for interactive, game-based media like Blooket to bridge the gap between students' learning difficulties and their high interest in engaging methods. This media is proposed as a potential solution to visualize abstract concepts and increase motivation in physics education.



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CORRESPONDING AUTHOR(S): putriahmaa38@email.com

INTRODUCTION

Physics, a branch of science, examines nature through observation, experimentation, and logic. It also fosters students' analytical skills and strengthens their conceptual understanding (Eka, 2020;

Tebriani, 2020). Yet, in secondary school, students often find physics difficult for three main reasons: abstract concepts, mathematical language, and the link between theory and reality (Rahmasari, 2019; Zahara et al., 2024). When teachers

primarily use lecturing and limit media use, they complicate matters and further reduce interest and engagement (Rozi et al., 2024; Hasan et al., 2021).

The subject of 'Matter and Its Changes' poses significant challenges for junior high school students. A survey of 26 eighth-grade students at Adhyaksa 1 Junior High School in Jambi found that 88.5% struggled with physics, and 61.5% considered it the most complex subject. Key contributing factors are difficult-to-understand learning resources (38.5%), the abstract nature of the material (30.8%), and the lack of illustrations of its application in daily life (26.9%). These findings suggest a gap between the complexity of 'Matter and Its Changes' and the instructional strategies used, potentially reducing student engagement and understanding (Azizah Siti Lathifah et al., 2024).

The rapid advancement of information technology and the distinct learning characteristics of today's students demand innovative, participatory, interactive, and student-centered teaching practices (Hasan et al., 2021). Game-Based Learning, which

incorporates game elements into educational activities, is a highly relevant strategy. This approach makes learning more engaging, fosters intrinsic motivation, and clarifies complex concepts via simulation and interaction (Plass et al., 2015; Qian & Clark, 2016). Numerous studies in science education show that Game-Based Learning enhances emotional engagement, memory, and conceptual understanding among students (Clark et al., 2016; Martí-Parreño et al., 2016).

Currently, many digital platforms use Game-Based Learning, including Blooket. Blooket is a web-based quiz tool that delivers learning materials through various game formats (Febriana & Pujosusanto, 2023). Studies have shown that Blooket increases student motivation and achievement (Adiningsih & Sulur, 2024; Nur et al., 2023). However, little research examines Blooket's use for teaching abstract physics topics like 'Substances and Their Changes' in junior high school. Most physics Game-Based Learning research focuses on other topics or higher education (Bado, 2022; Soflano et al., 2015). Thus, there is limited

evidence of Blooket's effectiveness in addressing challenges in junior high school physics, despite its theoretical promise.

Based on the above description, this study aims to analyse the need for the application of Blooket media based on Game-Based Learning in the subject of Substances and Their Changes at the junior high school level. This needs analysis is a fundamental stage in research and development (R&D) that aims to ensure the media created are truly aligned with real issues in the field (Branch, 2009). This study is expected to make dual contributions, both theoretical and practical.

From a theoretical perspective, this study can enrich academic literature on the application of Game-Based Learning, particularly through the Booklet platform, in the context of junior high school physics instruction of abstract material. This study also has the opportunity to test the relevance of engagement and motivation theory in Game-Based Learning (Ryan & Deci, 2000) in the Indonesian educational environment. In practice, the results of this study can serve as a reference for educators and media developers regarding the needs,

obstacles, and opportunities in integrating Blooket. The findings of this needs analysis can serve as a basis for designing effective Blooket media prototypes, compiling operational guidelines for teachers, and supporting the implementation of innovative learning aligned with schools' digital infrastructure, given that 96.2% of students already have access to devices. Thus, this research not only addresses contextual issues at Adhyaksa 1 Junior High School in Jambi but also provides a framework adaptable for developing similar learning media in physics and other sciences.

METHOD

Research Design and Approach

This study used a mixed-methods approach, collecting qualitative and quantitative data separately and then combining the results for a well-rounded understanding (Creswell & Plano Clark, 2018). This method was selected to answer complex questions by blending detailed insights from interviews with broader trends identified in surveys (Fetters et al., 2013). Grounded in interpretivism, which holds that social reality is shaped by

individual views and context and requires direct engagement with participants (Denzin & Lincoln, 2018), the study emphasizes the qualitative component to explore ideas in depth, while quantitative results support and broaden these findings.

Time, Place, and Subject of Research

The research was conducted in the odd semester of the 2025/2026 academic year at Adhyaksa 1 Junior High School in Jambi. The research subjects were divided into two groups. First, the qualitative subjects were two science teachers who were purposively selected based on the following criteria: 1) at least three years of experience teaching the subject 'Substances and Their Changes,' and 2) openness to the use of technology in learning. Second, the quantitative subjects were 26 eighth-grade students, selected using total sampling because they were the population of students currently studying the subject. The participation of all subjects was based on the principles of voluntariness and confidentiality of identity.

Research Procedure

This research procedure was carried out in three main sequential and complementary stages. The first stage was

conducting interviews with science teachers to gather in-depth information on the curriculum, teaching tools and preparations, the learning media used, and teachers' views on the application of game-based learning with Blooket media in physics learning. The second stage involved distributing initial needs questionnaires to students to map their understanding of the material, identify learning barriers, record their experiences with digital media, and capture their expectations for Booklet-based learning.

After data collection, the third stage of data processing and analysis commenced. Qualitative data from teacher interviews were analysed interpretively to capture emerging meanings and themes, while quantitative data from student questionnaires were processed descriptively and presented as percentages. The two sets of analysed data were then combined and synthesised to build a holistic and contextual picture of the existing learning conditions and the real need for the application of Booklet media as an innovative solution.

Research Instruments and Validity Reliability Tests

This study used two types of instruments to collect data. The first instrument was a semi-structured interview guide for teachers, containing 38 open-ended and guided questions. The questions covered six main aspects: curriculum and planning, media and learning resources, learning barriers, perceptions of game-based learning, the potential of Blooket, and student activity. The content validity of this instrument has been validated through expert judgement by two lecturers in the field of science education and learning technology using Aiken's V index (Aiken, 1985), which produced an average score of 0.87 and is classified as high. In addition, a readability test and pilot interview were conducted with a teacher from another school with similar characteristics to ensure the clarity and ease of understanding of each question.

The second instrument was a Student Needs Questionnaire comprising 22 closed-ended multiple-choice questions. This questionnaire was designed to measure four dimensions, namely understanding of the material, learning difficulties, interest in

learning media, and expectations regarding the use of the Booklet. The construct validity of the instrument was tested using Pearson's product-moment correlation analysis, in which all questions were found to be valid because their calculated r values were greater than the table r (0.404) at the 5% significance level. Furthermore, the questionnaire's reliability was assessed using Cronbach's Alpha, with SPSS 25, yielding an α value of 0.781. This value indicates that the instrument has a good and consistent level of reliability (Cronbach, 1951; Tavakol & Dennick, 2011).

Data Analysis Techniques

The data in this study were analysed separately with qualitative and quantitative approaches, then integrated. Qualitative data from interviews were analysed using the interactive model of Miles, Huberman, and Saldana (2020), which has three concurrent phases: data reduction, data display, and conclusion drawing/verification. Data reduction involved selecting, centralising, and simplifying raw data through repeated transcript readings and open coding by research themes. Reduced data were presented as descriptive narratives and

thematic matrices in the data display phase to identify patterns. Finally, patterns were interpreted and verified by rechecking raw data (member checking) to ensure validity (Lincoln & Guba, 1985).

Meanwhile, questionnaire data were analysed using descriptive statistics, including calculating percentages to show overall trends in student responses. Next, frequencies and percentages for variables, such as comprehension levels, were extracted and illustrated using tables and bar charts. This sequence provided a general overview designed to complement the qualitative narrative rather than to test hypotheses or cause-and-effect relationships (Creswell & Creswell, 2018). The percentage was calculated using the following formula.

$$P = \frac{F}{N} \times 100\%$$

Data Integration and Triangulation

Qualitative and quantitative findings were integrated using source (teacher and student data) and method (interviews and questionnaires) triangulation. Comparing and synthesising these results confirmed, enriched, or explained findings and supported robust conclusions about

learning needs and Booklet feasibility (Fetters et al., 2013).

RESULTS AND DISCUSSION

Interviews with two science teachers at Adhyaksa 1 Junior High School in Jambi highlighted the current state of physics education and the need for interactive learning media. Both teachers reported using the Merdeka Curriculum and developing learning materials through teacher collaboration and individual efforts, often using ChatGPT and Canva to quickly prepare lessons.

Given these findings, there is a pressing need to address digital media limitations and to develop solutions to improve both access to and integration of interactive learning resources. To support more effective physics teaching, concrete steps should be taken to develop and implement accessible, engaging, interactive platforms that overcome existing barriers.

The interview results revealed that teachers had never applied deep learning or game-based learning approaches in their teaching, although they had used other models such as Problem-Based Learning (PBL) and simulations. As a result, teachers

reported that students often struggled to understand abstract physics concepts, especially in Matter and Its Changes. Furthermore, students tended to get bored easily, particularly during the last few hours of class, requiring teachers to employ strategies such as icebreakers, group discussions, or practical work to maintain engagement. In response to these challenges, the assessment system implemented an integrated, holistic assessment through daily observation with formative and summative assessment techniques. Process assessment indicators include participation in discussions, willingness to ask questions, and contribution to collaborative learning.

Specifically regarding Blooket, although neither had ever used it, the teachers expressed high enthusiasm and optimism about its potential. According to the teachers, Blooket can make learning more enjoyable, motivate students, and improve conceptual understanding when well integrated into the learning materials. The teachers also emphasised the importance of training other teachers to effectively utilise game-based media such as Booklet. The teachers hope that the use of

game-based digital media can be widely implemented to support the achievement of learning objectives and improve students' active learning skills.

The teacher's positive view aligns with the student needs survey, which highlights learning challenges, media experiences, and acceptance of digital learning. Twenty-six eighth-grade students at Adhyaksa 1 Junior High School in Jambi participated. Most struggled with the Substances and Their Changes topic but were enthusiastic about interactive media, which they felt aided understanding. Survey data are shown in Table 1.

Table 1. Students' Level of Understanding and Difficulties with Physics Material

No.	Aspects measured	Findings (%)	Category
1	Level of understanding of physics material	42.3% lack understanding	High
2	Experience of difficulties in learning physics	3.8% do not understand	Very high
3	Most difficult material (Substances and their Changes)	61,5%	High

The analysis shows that 88.5% of students experience difficulties in learning physics, with 46.1% lacking understanding of the material. A total of 61.5% of students consider the material on Substances and

Their Changes to be difficult. The main contributing factors include the material being too abstract, a lack of practical examples, overly difficult explanations, a limited range of engaging media, and a lack of practice questions.

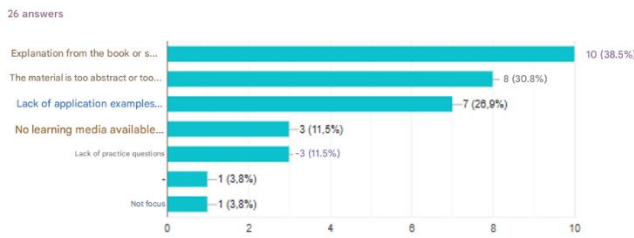


Figure 1. Factors that make it difficult to understand physics lessons

These findings indicate that learning difficulties are mainly caused by abstract material and explanations that are difficult to understand, coupled with a lack of real-life examples and practice questions. This aligns with teachers' statements that students easily become bored when learning is only theoretical, as well as Saba's (2024) research, which emphasises the need for interactive media, such as educational games, to visualise abstract concepts, making them easier to understand.

Table 2. Activity and participation in the learning process

No.	Aspects measured	Findings (%)
1	Interest in physics material	84,6%
2	Factors that attract physics learning	42.3% have quizzes or games

No.	Aspects measured	Findings (%)
3	Feelings when having to present discussion results in front of others	53.8% are nervous or afraid of making mistakes
4	Learning media that most encourages activity	57.7% are educational gaming platforms

Based on Table 2, most students (84.6%) expressed interest in physics lessons, with 42.3% liking quizzes or games. However, 53.8% still felt nervous when presenting the results of discussions. On the other hand, the majority of students (57.7%) considered educational gaming platforms the most effective learning medium for encouraging active learning.

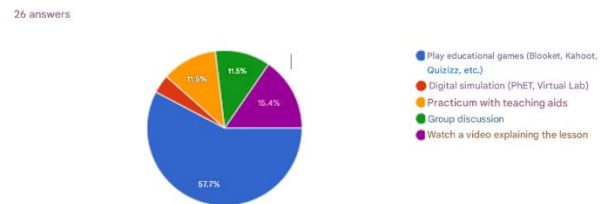


Figure 2. Learning activities or media that most encourage active learning

The graph in Figure 2 shows that educational games are preferred over other methods, reinforcing the finding that students need more interactive learning. This confirms the importance of integrating gamification and experience-based approaches to create a learning environment that is not only engaging but

also reduces student anxiety and increases their active participation in learning.

Table 3. Infrastructure readiness and acceptance of Blooket

No.	Aspects measured	Findings (%)
1	Media frequently used by teachers when teaching physics	11.5% PowerPoint videos 53.8% Educational videos 23.1% Educational games 11.5% Teaching aids 30.8% Textbooks
2	Perception that digital media facilitates understanding	57,7%
3	Ownership of digital devices	96,2%
4	Digital platforms frequently used for independent learning	42.3% YouTube 26.9% Learning applications 23.1% Educational games 11.5% LMS 7.7% Do not use digital platforms
5	Interest in using game-based media such as Blooket	38.5% Very interested 53.8% Interested
6	Expected benefits of Blooket for conceptual understanding	65,4%

According to Table 3, the majority of teachers and students (96.2%) have access to digital devices, and more than half (57.7%) believe that digital media facilitates learning. In practice, the most frequently used media are educational videos (53.8%), followed by textbooks (30.8%) and educational games (23.1%). For

independent learning, YouTube is the most dominant platform used (42.3%).

Specifically, regarding the use of gaming platforms such as Blooket, more than half of students (53.8%) are interested and (38.5%) are very interested in using Blooket in physics learning, while only a small proportion are less interested.

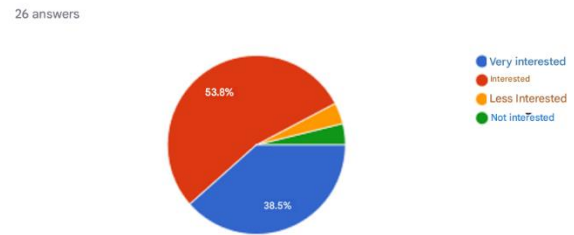


Figure 3. Student Interest in Using Blooket in Physics Learning

These findings confirm that educational games have great potential for integration because the majority of students have intrinsic motivation to learn in a more interactive and enjoyable way.

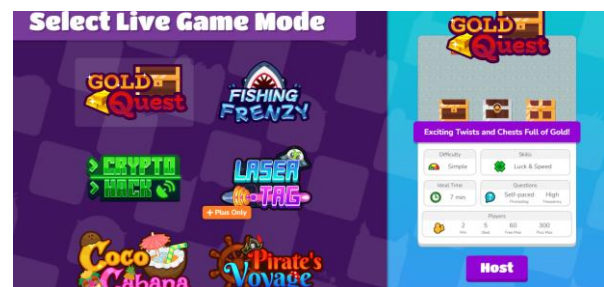


Figure 4. Blooket Platform Display

Blooket is a web-based interactive quiz platform that offers a variety of interesting game modes and can be played

individually or in groups (Nur et al., 2023). Teachers can create interactive questions with various modes, such as Gold Quest, Tower Defence, Fishing Frenzy, and others. Through these features, abstract concepts can be packaged into fun, competitive, and easy-to-understand activities.

In line with the findings of Syalwa et al. (2025), the use of Blooket improves learning because students feel interested and motivated to participate in a fun way, making the material easier to understand and the learning process less tedious. This support is reinforced by Table 3, which shows that 65.4% of students have high expectations that the Booklet can help them with their learning.

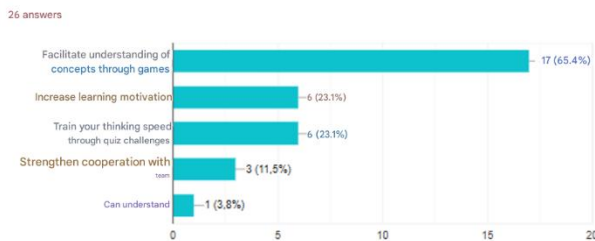


Figure 5. Students' expectations regarding the benefits of using Blooket in learning

Thus, there is a correlation between students' continued difficulty understanding abstract material and their interest in game-based media. Therefore, integrating Blooket into physics instruction

is expected not only to help students understand concepts but also to increase active participation and student cooperation.

DISCUSSION

Teacher interviews and student questionnaires reveal a complex landscape of learning needs regarding "Matter and Its Changes." Both data sources confirm the main challenge: the abstractness of the topic, consistent with difficulties in junior high science learning (Johnstone, 1991). Teachers seek more dynamic methods not just for engagement, but as cognitive supports that static textbooks lack. Blooket, by embedding abstract concepts in interactive game mechanics, meets this need. Cognitive load theory shows that learning improves when complex information is managed interactively (Sweller et al., 2019). For example, a Tower Defense game mode could model particle properties, making learning experiential instead of rote. The true pedagogical need is to turn abstract content into structured, challenge-based learning that actively supports cognitive processing.

A critical and revealing finding is the coexistence of high student interest in educational games with significant anxiety during individual presentations. This pattern suggests that traditional classroom environments often foster a performance-oriented climate that can induce evaluative anxiety, whereas well-designed games cultivate a mastery-oriented climate focused on task accomplishment and incremental progress (Ryan & Deci, 2000). Blooket's inherent design, which provides immediate feedback tied to in-game actions rather than personal judgment, can help mitigate this ego threat. The platform's team-based modes offer a powerful avenue to redesign the social and motivational architecture of the classroom, shifting the focus from individual appraisal to collective problem-solving and shared goals. This directly addresses the identified affective need for a low-stakes, collaborative learning environment rich in instant, non-threatening formative feedback. Intentionally implementing Blooket to foster cooperative play can thus build positive social interdependence and reduce academic anxiety that hampers participation.

Furthermore, triangulating the data reveals a crucial convergence of enthusiasm between teachers and students, alongside a distinct gap in pedagogical readiness. Teacher optimism is a vital asset, as educator buy-in and positive perceptions are strongly correlated with successful technology integration (Scherer et al., 2019). However, the teachers' candid admission of having no structured experience with game-based learning underscores a fundamental capacity deficit. Enthusiasm without corresponding pedagogical-digital expertise or Technological Pedagogical Content Knowledge (TPACK) risks leading to a superficial use of technology that substitutes one tool for another without transforming the learning experience (Mishra & Koehler, 2006). This stands in contrast to the ready infrastructure indicated by high student device access. Consequently, the analysis uncovers a pivotal organizational need: comprehensive teacher professional development that moves beyond basic technical proficiency in Blooket to foster the strategic ability to design meaningful gameplay aligned with specific physics learning objectives. The high student interest and access create a

fertile ground for implementation, but its educational success depends on teachers becoming skilled designers of game-based learning sequences.

In summary, this needs analysis shows that Blooket is not meant to be a single technological solution. Instead, it should serve as a multifaceted intervention that addresses several interconnected domains. The findings point to three interdependent pillars. First, the Content & Cognition Pillar needs the deconstruction of abstraction. This is achieved through interactive visualization and game mechanics. Second, the Social & Affective Pillar requires activity designs that use team dynamics and intrinsic motivation. Gameful design should be used to lower anxiety. Third, the Organizational & Capacity Pillar calls for developing teacher TPACK for Game-Based Learning. It also requires institutional support structures. Blooket stands out as a suitable platform for these needs. However, it must be used as part of a well-planned instructional design, not as a stand-alone activity. This design should address the cognitive, motivational, and pedagogical challenges found in this study. By doing so, it can help bridge the

gap between student learning difficulties and their potential for engaged participation.

CONCLUSION

Based on the needs analysis conducted at Adhyaksa 1 Junior High School in Jambi, implementing Blooket as a game-based learning medium is both necessary and feasible. This addresses challenges in teaching the abstract topic of Matter and Its Changes. The study shows that a significant gap exists between students' learning difficulties and their interest in game-based learning. Most students struggle because the material is abstract, lacks concrete examples, and uses too little interactive media. Despite this, 88.5% of students face difficulties in physics, 92.3% want to use Blooket, and 57.7% see games as a way to enhance active learning. Teachers fully support the initiative, and 96.2% of students have access to devices. Blooket is a strategic intervention. It can help visualize complex concepts, provide contextual examples, and create a collaborative, low-anxiety environment. This approach aims to boost motivation, participation, and conceptual

understanding in junior high school physics.

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