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Preliminary Study of Genially Educational Games for Collaboration on Business and Energy Materials

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Abstract
This preliminary study explores the potential of Genially-based educational games to enhance students' collaboration skills in physics, specifically in the work-and-energy unit. A mixed-methods approach was used, collecting data through teacher interviews and a Likert-scale questionnaire administered to 27 ninth-grade students at SMP Adhyaksa 1 Jambi. Results show students' conceptual understanding is good (mean 3.67), although 85.2% still find abstract concepts challenging. Teachers' media use remains limited, while students view educational games as beneficial, especially when accompanied by brief explanations and practice questions. Collaboration skills are rated good to very good (mean 3.95), particularly in respecting opinions and accepting suggestions. These findings suggest Genially-based educational games have significant potential as innovative learning media that support conceptual understanding and foster collaboration skills aligned with 21st-century educational goals.

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INTRODUCTION

Physics requires creative and skillful thinking, as its material demands deep conceptual understanding rather than memorization (Hidayatulloh, 2020, Rohman, et.al 2019). Work and energy are key topics in physics, serving as the foundation of classical mechanics and a prerequisite for further concepts. Yet, studies show that students struggle with misconceptions and have difficulty connecting abstract ideas. This leads to fragmented knowledge and hinders their problem-solving (Rahmatina et al., 2018). In addition, students' multi-representational ability in work-and-energy problems is low, with 69% having limited proficiency (Safitri & Zainuddin, 2024). These findings highlight the need for innovative teaching to address abstraction and improve conceptual understanding.

In the context of 21st-century learning, collaboration skills are a critical competency that must be developed in school environments. Key benefits of collaboration include enhanced academic performance, improved problem-solving skills, and increased engagement through productive group relationships and shared discussions (Dhitasarifa et al., 2023; Laelasari et al., 2017; Pulgar et al., 2022). In physics learning, collaboration has been shown to improve students' academic achievement, particularly when peer connections are strong. Therefore, integrating collaborative activities into learning not only addresses contemporary demands but also helps overcome learning difficulties via discussion and collective knowledge construction.

Interactive digital media are widely used in science education to enhance student engagement and understanding (Rohman, et.al 2020). A meta-analysis by Niyanti et al. (2022) shows that models such as Problem-Based Learning (PBL) and digital tools, such as PhET simulations, can improve physics learning. However, most digital media focus on individual achievement and are not designed to build collaboration skills. Genially, a digital platform for creating interactive educational content with real-time collaborative features, offers strong potential in this area (Haleem et al., 2022). Its multi-user editing, discussion boards, and group challenges help students interact, share ideas, and complete tasks as a team (Haleem et al., 2022; Ramadhani, 2025). Research also shows that using Genially in physics instruction, particularly on topics such as Newton's laws, can boost motivation and engagement through collaborative problem-solving (Febrina et al., 2023; Huda et.al., 2025). Genially has also been used to develop interactive e-modules for sound and light waves, showing its feasibility as an innovative medium (Enstein et al., 2022).

Despite the identified potential of Genially as an interactive learning medium, research specifically examining its effectiveness in developing collaboration skills in physics, particularly in the work-and-energy material, remains limited. Most existing studies focus more on individual motivation and conceptual understanding, while the mechanisms and features of Genially that support collaboration have not been explored in depth. Furthermore, few preliminary studies have identified the needs of teachers and students regarding the design of Genially-based educational games oriented toward collaboration. Thus, an exploratory study is needed to bridge the gap between Genially's technical potential and pedagogical needs in collaborative physics learning.

This preliminary study explores teacher and student needs regarding collaborative learning media for work and energy material. It also examines students' conceptual understanding and collaboration skills. These findings form the basis for media design. The study further identifies potential and mechanisms for using Genially-based educational games to support collaborative physics learning. The research aims to provide an empirical foundation for a Genially-based educational game prototype. This prototype is intended to enhance conceptual understanding and optimize collaboration skills, meeting the demands of 21st-century learning.

METHOD

Research Methods

This study employs an exploratory sequential mixed-methods design (Creswell & Plano Clark, 2018), combining qualitative and quantitative approaches in distinct, consecutive phases. The focus is to systematically examine students' understanding, collaboration skills, and perceptions of digital learning media in the context of physics education. First, the research team explores and understands contextual challenges through qualitative investigations. Insights from this phase then guide the team as they use quantitative methods in the subsequent phase to measure and generalize specific variables. This design suits preliminary studies that seek to identify needs and provide foundational data for future intervention development.

Research Setting and Subjects

This study was conducted at SMP Adhyaksa 1 Jambi on August 12, 2025, focusing on Grade IX science. Participants were two science teachers and 27 Grade IX students. The teachers, as key informants, shared insights through interviews on learning challenges, particularly in teaching, energy, and collaboration. The students completed a needs questionnaire, providing data on their conceptual understanding, collaboration, digital media experience, and expectations for game-based learning tools. This enabled a thorough preliminary exploration from educator and learner perspectives and laid a strong foundation for understanding needs before developing educational media.

Data Collection Procedures

a. **Preliminary Study (Week 1):** In-depth semi-structured interviews were conducted with the two science teachers. The objective of this stage was to identify specific challenges in teaching work and energy, assess the limitations of existing learning media, and gather teachers' perspectives on the significance and implementation of student collaboration. Each interview lasted approximately 45–60 minutes and was audio-recorded with prior consent.

b. **Student Needs Analysis (Week 2):** A Likert-scale questionnaire was distributed to all 27 Grade IX students. The objective was to collect quantitative data on: (1) initial understanding of work and energy concepts, (2) level of collaboration skills in physics learning, (3) experience with interactive digital media, and (4) expectations toward game-based learning media. The questionnaire was administered in the classroom under teacher supervision.

c. **Data Integration (Week 3):** Qualitative data from teacher interviews and quantitative data from student questionnaires were compiled to systematically combine findings. The objective of this stage was to prepare the data for thorough analysis by integrating teacher and student perspectives.

Research Instruments

The research instruments included the following components. First, the Teacher Interview Guide comprised open-ended questions developed based on the framework of technological pedagogical content knowledge (TPACK) and collaborative learning principles (Mishra & Koehler, 2006). Questions focused on: conceptual difficulties in work and energy, current media usage, and perceived opportunities for collaborative learning through digital tools.

In addition to the interview guide, the Student Needs Questionnaire consisted of 15 items using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The questionnaire was adapted from validated instruments on collaboration skills (Lai, 2011) and digital learning readiness (Adnan & Anwar, 2020). A pilot test was conducted with 5 students from a different class to ensure clarity and reliability.

Data Analysis Techniques

Data were analyzed using two complementary approaches. For qualitative data, interview transcripts were analyzed through thematic analysis following Braun and Clarke (2006): (1) transcription and familiarization, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the final report. To ensure validity, triangulation was performed by comparing teacher responses, and member checking was conducted by sharing summaries with the interviewees for confirmation (Lincoln & Guba, 1985).

For quantitative data, analysis proceeded descriptively: questionnaire data were summarized using percentages and means. Reliability of the collaboration skills scale was assessed using Cronbach's alpha, yielding a value of 0.82, indicating good internal consistency (Gliem & Gliem, 2003). The percentage for each item was calculated using the following formula: **(Frequency of response for the item / Total number of responses) × 100%**.

RESULTS AND DISCUSSION

Results

The research results were obtained from questionnaires distributed to ninth-grade students at Adhyaksa 1 Junior High School in Jambi. The collected data covered three aspects: students' understanding of energy and simple machines, students' responses to physics learning media, and students' collaboration skills during the learning process. A summary of the questionnaire results is presented in Table 1:

Table 1. Students' Level of Understanding of Material on Work, Energy, and Simple Machines

No.	Aspects Assessed	Results	Scores
1	Average understanding of the concept	3,67	3,67
2	Learning difficulties	85.2% of students still experience difficulties.	-
3	The most difficult material to understand	Work, energy, and simple machines (14);	-

No.	Aspects Assessed	Results	Scores
		Vibrations & Waves (8); others (5)	
	Mean	**3,67**	**3,67**

Based on Table 1, students' understanding of energy work and simple machines was in the good category, with a score of 3.67. However, 85.2% of students still reported difficulties in learning this material. The most difficulty was experienced in the sub-material on energy work and simple machines (14 students), followed by vibrations, waves, and light (8 students).

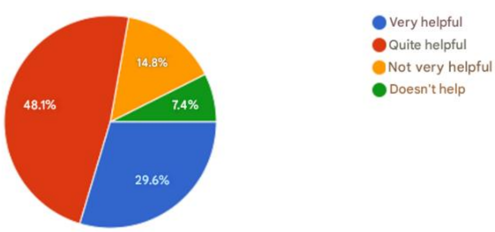

Figure 1. Students' Level of Understanding of Material on Work, Energy, and Simple Machines

These findings indicate that although conceptual understanding is generally good, there are obstacles in certain abstract materials that require innovative learning approaches.

Table 2. Student Responses to Physics Learning Media

No.	Aspects to be Assessed	Results
1	Physics is considered interesting.	81,5% Yes 18,5% No
2	Frequently used learning media	Textbooks 37.0%; Videos 18.5%; Teaching aids 14.8% Student worksheets 11.1% PowerPoint 7.4% Educational games 7.4%
3	Have used educational games	92,6% Yes 7,4% No
4	Responses to educational games	29.6% Very helpful; 48.1% Quite helpful; 14.8% Not very helpful 7.4% Not helpful
5	Desired features in educational games	Explanation of material 40.7% Questions/quizzes 22.2% Step-by-step instructions 18.5% Voice narration 18.5%
6	Device ownership (mobile phone/laptop)	96,3% Yes
7	Internet usage habits	96,3% Yes
8	Ability to operate applications/Genially	88,9% Yes 11,2% No
9	Educational games increase enthusiasm for learning	70,4% Yes 29,6% No

According to Table 2, most students find physics lessons interesting (81.5%). However, only 7.4% of students use educational games regularly, while 92.6%

report using them at least occasionally. Of those who have used educational games, 29.6% find them very helpful and 48.1% quite helpful. Students most desire brief explanations of material (40.7%) and practice questions or quizzes (22.2%) in these games. Almost all students have learning devices (96.3%) and use the internet (96.3%), and 88.9% can operate digital apps such as Genially. Finally, 70.4% of students believe educational games can increase their enthusiasm for learning Physics.

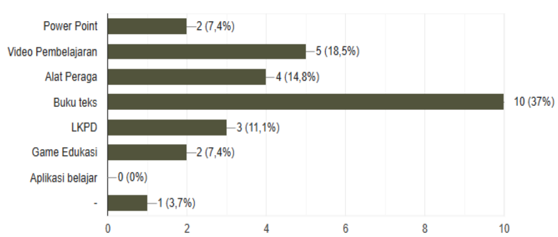

Figure 2. Student Responses to Physics Learning Media

This data confirms that interactive digital media has significant potential to support physics learning in the classroom.

Table 3. Student Collaboration Skills

No.	Aspects to be Assessed	Scores
1	Actively participate in discussions	3,70
2	Be responsible	3,74
3	Accept suggestions	4,15
4	Respect opinions	4,22
	Mean	**3,95**

Based on Table 3, students' collaboration skills are generally in the good-to-very good range. The indicator of respecting opinions received the highest average score (4.22) in the very good category, followed by the indicator of accepting suggestions (4.15), also in the very good category. Meanwhile, the indicators of active discussion (3.70) and responsibility (3.74) are in the good category.

Building on these observations of collaboration skills, teacher interviews and student questionnaires indicate that students' understanding of the concepts of work and energy is adequate; however, most continue to struggle with abstract concepts that require multiple representations. As a result, they often experience misconceptions and find it difficult to connect one concept to another.

Teachers observe students develop collaboration skills as they respect others' opinions and accept peers' suggestions. This enables teachers to design group-learning activities that optimize collaboration.

While teachers still rely on textbooks and videos as learning media, most students report that educational games, when paired with brief explanations and practice questions would help them better understand the material. Based on these findings, it is recommended that teachers integrate Genially-based educational games into their instruction to enhance conceptual understanding and foster students' collaboration skills.

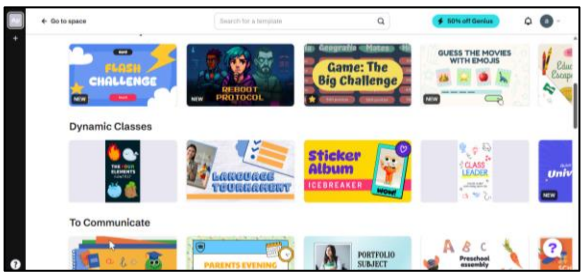

Figure 3. Genially Home Screen

According to Ramadhani (2025), Genially is a platform that offers interactive features, such as animations, quizzes, and simulations, to improve learning effectiveness. The main advantages of Genially in learning include presenting material that is more engaging and less monotonous, and providing interactive features that increase student participation (Haleem et al., 2022).

Building on these advantages, the study's results show that although students' average understanding of the concepts of work, energy, and simple machines was in the good range, most still had difficulty with abstract material. These findings are in line with the research by Rahmatina et al. (2018) and Safitri & Zainuddin (2024), which states that misconceptions and low multipresentation skills are the main obstacles in understanding the concepts of work and energy.

In addition, the survey data indicate that the learning media currently used by teachers are still limited to textbooks and videos. However, most students stated that educational games can help them understand the material, especially when accompanied by brief explanations and practice questions. This aligns with the findings of Febriana et al. (2023) and Einstein et al. (2022), which confirm Genially's potential as an interactive medium for science learning. In other words, interactive digital media can serve as an innovative learning strategy aligned with 21st-century learning needs.

This study has limitations: it was conducted at a single school with a relatively small sample size, so its results cannot be generalized. Consequently, future studies should clearly define their objectives and consider using experimental designs or larger samples to more thoroughly assess the effectiveness of generic-based educational media.

Discussion

This preliminary study presents a nuanced view of student understanding, media use, and collaborative skills in learning physics, specifically the concepts of work and energy. Although the average conceptual understanding score (3.67) is rated as "good," 85.2% of students still report difficulty, especially with abstract topics such as the relationship between work, energy, and simple machines. This gap between self-reported understanding and perceived difficulty aligns with research showing that students often recall physics formulas but struggle with deeper conceptual integration and multi-representational reasoning (Safitri & Zainuddin, 2024). Difficulty with abstract concepts highlights a key deficiency that traditional, non-interactive media like textbooks and standard videos, commonly the primary instructional tools, frequently do not address. This observation aligns with Niyanti et al. (2022), who identified the shortcomings of passive media in illustrating abstract physical phenomena.

A main finding from comparing student and teacher responses is a potential association between students' struggles and their preferred media. Students who reported the most difficulty with abstract concepts (n=14) also indicated a preference for 'short explanations' (40.7%) and 'practice questions/quiz' (22.2%) in an educational game. This suggests that students actively seek clear explanations and practice opportunities to deepen their learning. This finding is consistent with cognitive load theory (Sweller, 2011), which maintains that effective tools clarify complex ideas through clear steps and practice, allowing students to focus their cognitive resources on genuine learning.

The study shows a paradoxical but positive result. Despite conceptual challenges and limited media variety, students' collaborative skills were rated "good to very good" (average 3.95). The highest scores were for "respecting opinions" (4.22) and "accepting suggestions" (4.15). While students are not yet deeply engaged in active, generative discussion ("active discussion" scored 3.70), they have strong foundational social-emotional readiness for collaboration. This offers a significant pedagogical opportunity. Collaboration is not just a social goal; it can serve as a crucial cognitive bridge (Pulgar et al., 2022). A structured collaborative environment, supported by the right tool, can help students verbalize difficulties, co-construct understanding through peer explanation, and tackle complex problems together. This approach addresses both conceptual gaps and the need for more active dialogue.

The research shows students are ready for digital innovation. Most have access to devices (96.3%) and the internet (96.3%), and 88.9% feel confident using Genially. Their strong digital literacy and belief that educational games raise motivation (70.4%) create ideal conditions for interactive media. Genially provides concise explanations, interactive quizzes, and collaborative tools like shared projects and real-time feedback. These features make it the right bridge to active learning. It replaces static media and builds conceptual understanding through engaging, collaborative tasks. This supports Haleem et al. (2022), who state that interactive digital platforms shift learning from passive delivery to active construction.

The primary limitation of this study is its reliance on self-reported questionnaire data, without corroboration through direct observation or measurement of collaborative behavior during learning tasks. Although teacher interviews offer partial external validation, future research should use observational or design-based methods to empirically determine whether a Genially-based collaborative game can translate students' capacity for collaboration into effective, demonstrable gains in conceptual understanding. The clear alignment observed here among students' conceptual needs, collaborative tendencies, and digital competence underscores the need to develop and rigorously test such an intervention as the next logical step.

CONCLUSION

This study finds that while students generally understand work and energy concepts, they struggle with abstract subtopics, revealing the limits of current resources. Students are digitally prepared, value concise educational games, and show strong collaboration skills, which are ideal for innovative learning. These factors support the significant potential of a Genially-based educational game. Teachers are strongly encouraged to adopt interactive digital tools like Genially to address conceptual gaps, enhance collaboration, and better prepare students for 21st-century physics education. Further experimental research with larger samples is needed to measure Genially's effectiveness in these areas.

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