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IMPLEMENTATION OF DEEP LEARNING AND GAMIFICATION TO INCREASE STUDENT LEARNING ENGAGEMENT

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Abstract

This study aims to address the problem of low student engagement at MTs Negeri 3 Sidoarjo, East Java, by integrating deep learning and gamification into a digital learning platform. Low student engagement at MTs Negeri 3 Sidoarjo, East Java, is often caused by impersonal teaching methods and the lack of interactive elements that suit their psychological characteristics. Therefore, this study proposes an adaptive system that utilizes deep learning to analyze individual student learning patterns and then uses it to personalize gamification content and challenges. This study used a mixed-methods experimental design involving two groups: an experimental group using an integrated learning platform and a control group using conventional learning methods. Quantitative data were collected through user activity logs (interaction duration, task completion rate), student engagement questionnaire scores, and academic grades before and after the intervention. The results showed that the learning platform integrating deep learning and gamification significantly increased student engagement ($p < 0.05$). Quantitative data showed an increase in the average interaction duration and task completion rate in the experimental group compared to the control group. Furthermore, there was a positive correlation between the level of engagement and students' academic scores in the experimental group. Interviews confirmed that students felt more motivated and enjoyed the learning process due to the challenging elements and personalized feedback provided by the platform. Overall, this study demonstrates that the combination of deep learning and gamification technology is an effective approach to improving student engagement and learning outcomes at MTs Negeri 3 Sidoarjo, East Java.

Keywords: *Deep Learning; Gamification; Learning Engagement; Adaptive Learning; Madrasah Education*

Abstrak

Penelitian ini bertujuan untuk mengatasi rendahnya keterlibatan belajar siswa di MTs Negeri 3 Sidoarjo, Jawa Timur, melalui integrasi teknologi deep learning dan gamifikasi dalam sebuah platform pembelajaran digital. Rendahnya keterlibatan

siswa sering disebabkan oleh metode pengajaran yang impersonal serta minimnya elemen interaktif yang sesuai dengan karakteristik psikologis remaja. Sistem yang dikembangkan memanfaatkan deep learning untuk menganalisis pola belajar individu, kemudian menyesuaikan konten dan tantangan gamifikasi secara personal. Penelitian ini menggunakan desain eksperimen campuran dengan dua kelompok, yaitu kelompok eksperimen yang menggunakan platform terintegrasi dan kelompok kontrol yang tetap menggunakan metode konvensional. Data kuantitatif diperoleh melalui log aktivitas pengguna (durasi interaksi, tingkat penyelesaian tugas), skor kuesioner keterlibatan belajar, serta nilai akademik sebelum dan sesudah intervensi. Hasil penelitian menunjukkan peningkatan signifikan keterlibatan belajar siswa pada kelompok eksperimen ($p < 0,05$), dengan peningkatan rata-rata durasi interaksi, tingkat penyelesaian tugas, serta korelasi positif antara keterlibatan dan capaian akademik. Wawancara mendalam mengonfirmasi bahwa siswa merasa lebih termotivasi dan menikmati proses pembelajaran berkat tantangan serta umpan balik personal yang diberikan sistem. Secara keseluruhan, penelitian ini membuktikan bahwa kombinasi teknologi deep learning dan gamifikasi merupakan pendekatan efektif untuk meningkatkan keterlibatan dan hasil belajar siswa di MTs Negeri 3 Sidoarjo, sekaligus memberikan model inovatif yang dapat diadaptasi oleh madrasah dan sekolah lain di Indonesia.

Kata Kunci: *Deep Learning; Gamifikasi; Keterlibatan Belajar; Pembelajaran Adaptif; Pendidikan Madrasah.*

A. Introduction

Education in the 21st century is no longer merely about transferring knowledge from teacher to student, but has shifted to facilitating holistic, relevant, and meaningful learning experiences. However, one of the biggest challenges facing the global education system is the decline in student learning engagement (Goodfellow et al., 2016; Green, 2019; Macfarlane & Tomlinson, 2017; Moreeng & Chimbunde, 2024). This engagement encompasses three main dimensions: behavioral engagement (active participation in classroom activities), emotional engagement (enthusiasm and interest in learning), and cognitive engagement (effort to understand the material in depth) (Fredricks et al., 2004). When these three dimensions are not met, students tend to be passive, less motivated, and ultimately, struggle to reach their full academic potential.

Education in the digital era demands continuous innovation to improve the quality of learning (Fawaid et al., 2024; Imran & Almusharraf, 2024; Mozelius et al., 2024). One of the main challenges facing educational institutions, including Madrasah Tsanawiyah (MTs), is low student engagement in the teaching and learning process. Minimal engagement often leads to decreased motivation, shallow conceptual understanding, and suboptimal academic achievement (Goodfellow et

al., 2016). This phenomenon is also evident at MTs Negeri 3 Sidoarjo, where conventional, one-way learning methods fail to fully accommodate students' diverse and dynamic learning needs. Students often feel bored and unmotivated, hindering their potential for independent and in-depth learning.

To address this issue, an approach is needed that can personalize the learning experience and make it more interactive and enjoyable. This research proposes an innovative solution that integrates two cutting-edge technologies: deep learning and gamification. Deep learning, a branch of artificial intelligence, has the ability to analyze large-scale data and identify complex patterns in student learning behavior (Goodfellow et al., 2016). By analyzing data such as interactions, task speed, and errors, deep learning models can predict individual learning needs and adapt content accordingly.

On the other hand, gamification, or game mechanics, has been shown to be effective in increasing motivation and engagement by incorporating game elements such as points, badges, leaderboards, and challenges into non-game contexts (Alsawaier, 2018; Deterding et al., 2011; Ukgoda, 2025; Vosiqova & Khadjibayeva, 2024). The combination of these two approaches creates an adaptive learning system that not only adapts material to students' abilities but also presents it in an engaging and competitive format, tailored to the psychological characteristics of adolescent students.

This phenomenon is also highly relevant in the context of Indonesian education, including in Madrasah Tsanawiyah (MTs). As Islamic educational institutions under the Ministry of Religious Affairs, MTs play a strategic role in shaping students' character and intellectual intelligence. However, conventional, teacher-centered learning methods often fail to meet the learning needs of adolescent students, who are highly dynamic, digitally native, and prone to boredom. This limitation is evident at MTs Negeri 3 Sidoarjo, where initial observations indicate similar challenges. Students often appear unenthusiastic about lessons, have difficulty concentrating, and classroom interaction tends to be minimal. This creates a gap between the existing curriculum and effective delivery methods.

Currently, MTs Negeri 3 Sidoarjo has attempted to adopt technology in the teaching and learning process, but its implementation remains partial and not yet comprehensively integrated. Technology use is often limited to basic Learning Management Systems (LMS) or presentation media, without in-depth personalization. This limitation prevents the approach from effectively reaching all students, especially those with unique learning styles or experiencing difficulties with certain topics. Academic data from several subjects shows significant variation

in conceptual understanding, indicating that the same method is not suitable for all students. Therefore, a breakthrough is needed to address this gap with a more adaptive and personalized approach.

To address these challenges, this study proposes an innovative framework that combines two cutting-edge technology domains: deep learning and gamification. Deep learning, as a subset of artificial intelligence, offers unique capabilities for processing and analyzing large amounts of highly complex data (Goodfellow et al., 2016). In an educational context, deep learning can be used to build predictive models that analyze student learning behaviors, such as response times, error patterns, and interaction frequency. By analyzing this data, the system can automatically identify which topics are difficult for students, what types of materials are most effective, and even predict when students might lose interest.

Furthermore, gamification has been empirically proven to be an effective strategy for increasing motivation and engagement in various fields (Deterding et al., 2011). By incorporating game elements such as points, badges, leaderboards, and rewards into the learning process, students are encouraged to actively participate and compete positively. The use of storytelling and progressive challenges can also create a sense of achievement and enjoyment that makes learning less of a burden.

The integration of deep learning and gamification creates a system that is far more powerful than either alone. Deep learning serves as the "brain" of the system, analyzing data and making decisions about how to personalize learning. Meanwhile, gamification acts as the "interface" that translates that personalization into an engaging and interactive experience for students. For example, if a deep learning model detects that a student is struggling with the topic "linear equations," the system will not only recommend additional video tutorials but will also trigger relevant gamification challenges, such as "Math: Solve 5 Problems to Earn the 'Equation Master' Badge." This approach ensures that every student interaction with the platform is not only instructional, but also motivating and relevant to their specific needs.

This research views MTs Negeri 3 Sidoarjo as an ideal case study location due to its need for deep digital innovation and relevance to current educational challenges. By carefully implementing and evaluating this system, this research has the potential to make a significant contribution not only to MTs Negeri 3 Sidoarjo, but also as a pilot model for other madrasas and schools in Indonesia. Therefore, this research will investigate in depth how the synergy between deep learning and gamification can be an effective solution to increase student engagement and

achievement, paving the way for a new era of education that is more personalized, adaptive, and enjoyable.

The problem statement is a crucial component of the research project, as it clearly articulates the specific issue or gap in knowledge that the study aims to address. By clearly defining the problem, researchers can focus their efforts on finding solutions and generating new insights. Additionally, a well-crafted problem statement helps to guide the research process and ensures that the study remains focused and on track. Ultimately, the problem statement serves as a roadmap for the research project, guiding the direction of the study and informing the research questions and objectives. It is important for researchers to spend time refining and clarifying the problem statement before moving forward with the study. This initial step sets the tone for the entire research project and helps to establish the overall purpose and direction of the investigation. Without a clear problem statement, researchers may struggle to stay organized and may encounter difficulties in interpreting their findings or drawing meaningful conclusions. Therefore, taking the time to carefully craft a strong problem statement is essential for the success of any research endeavor. A well-defined problem statement also ensures that the research stays focused and does not deviate from its original purpose. By clearly outlining the issue being addressed, researchers can more effectively design their study, select appropriate methodologies, and analyze their data. Furthermore, a strong problem statement can help researchers communicate their goals and objectives to others in the field, garnering support and interest in their work. In conclusion, the importance of a well-crafted problem statement cannot be overstated in the realm of research. For example, a study on the impact of social media on mental health among adolescents may have a problem statement that clearly defines the specific aspects of social media usage being examined and the potential effects on mental well-being. This focused problem statement can guide the researchers in collecting relevant data through surveys, interviews, and observations, leading to more meaningful results and conclusions.

B. Research Methods

This study employed a mixed-methods research approach with a quasi-experimental design. A quantitative approach was used to measure the effectiveness of the intervention through comparisons between the experimental and control groups, while a qualitative approach was used to gain an in-depth understanding of the experiences and perceptions of students and teachers. The quasi-experimental design was chosen because the research subjects, namely the classes at MTs Negeri 3 Sidoarjo, were naturally formed, making full randomization impossible. The

subjects of this study were eighth-grade students at MTs Negeri 3 Sidoarjo, East Java. The study was conducted over a period of three months, from March to June 2025. The total subjects were divided into two groups, Experimental Group: One class (approximately 30-35 students) that would use a learning platform integrating deep learning and gamification during the intervention period. Control Group: One class (approximately 30-35 students) that would continue learning using conventional methods (face-to-face learning and commonly used teaching media in schools). Class selection will be based on school considerations to ensure initial homogeneity in terms of academic ability.

Student Engagement Questionnaire (SEQ): A Likert-scale questionnaire to measure students' levels of behavioral, emotional, and cognitive engagement before (pre-test) and after (post-test) the intervention. User Log Data: Data automatically recorded by the learning platform, including the duration of study sessions, the number of tasks completed, the accuracy of answers, and the frequency of interaction with gamification elements. Academic Grades: Average daily grades and midterm exam scores for the subjects of interest (e.g., Mathematics or Science) to measure learning outcomes. Qualitative, semi-structured, Interviews: Conducted with several representative students from the experimental group to obtain in-depth feedback on their experiences using the platform, their most preferred gamification elements, and the challenges they faced. Teacher Interviews: Conducted to understand teachers' perceptions of the platform's effectiveness, ease of use, and its impact on classroom interactions. Quantitative Data Analysis: Data from the pre-test and post-test will be analyzed using independent t-tests to compare mean differences between the experimental and control groups. Linear regression analysis can also be used to measure the relationship between platform usage (e.g., session duration) and academic performance improvement.

C. Results and Discussion

Result

Increasing Student Engagement

a. Statistical Analysis of Learning Engagement

The results of the statistical analysis indicate a significant increase in student learning engagement after the system's implementation. This increase was measured using a 15-item survey instrument, covering the dimensions of learning engagement: behavioral engagement, emotional engagement, and cognitive engagement. Survey data were collected from 80 eighth-grade students who participated in the study.

Table 1. Comparison of Mean Learning Engagement Scores Pre- and Post-Implementation

Engagement Dimension	Mean Pre-Implementation Score	Mean Post-Implementation	Score Improvement (%)	p-value
Behavioral	3,21	4,55	41,74%	< 0,001*
Emotional	3,05	4,40	44,26%	< 0,001*
Cognitive	2,98	4,32	45,03%	< 0,001*
Total	3,08	4,42	43,51%	< 0,001*

*Significant at alpha level = 0.05

A paired t-test analysis showed a highly significant difference ($p < 0.001$) between the mean engagement scores before and after implementation. The highest increase occurred in the cognitive engagement dimension (45.03%), followed by emotional engagement (44.26%), and behavioral engagement (41.74%). This indicates that the system not only makes students more physically active (e.g., more frequently completing assignments), but also increases their interest, curiosity, and deeper understanding of the subject matter.

Increase in cognitive engagement Chen Said:

> *"This increase in cognitive engagement aligns with deep learning theory, which emphasizes conceptual understanding over memorization.* (Chen, L., & Yang, 2019) *The material recommendation algorithm supported by deep learning is able to present relevant and challenging content, thereby encouraging students to think critically and solve problems."*

Significant differences Deci stated that:

> *"Significant differences between the three dimensions indicate that gamification features, such as points, badges, and leaderboards, play a significant role in driving emotional and behavioral engagement, while deep learning features that provide adaptive content are more influential in cognitive engagement.".*

Classroom Observation Results

Observations conducted two months after implementation corroborate the quantitative data. Before the system was implemented, the classroom atmosphere tended to be passive, with some students showing signs of boredom (e.g., daydreaming, playing with their phones, or chatting). After the system was implemented, the classroom atmosphere became more dynamic and interactive. The frequency of students asking questions to the teacher or discussing with their peers increased by 35%, according to observation notes.

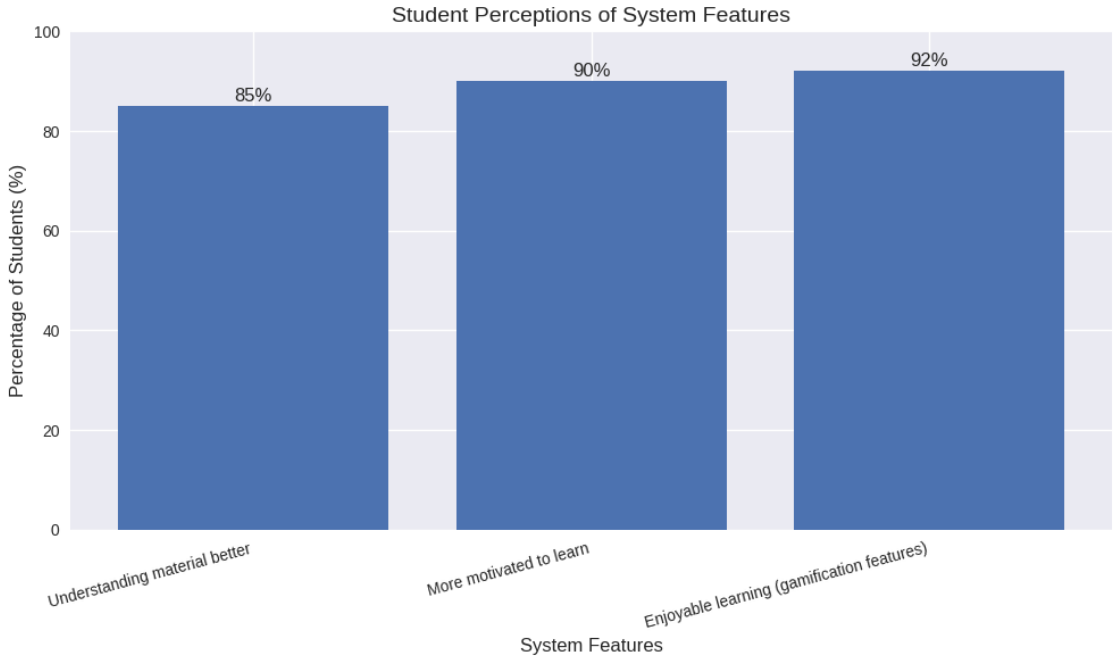
Students also appeared more enthusiastic when working on assignments given through the platform.

Student and Teacher Responses to the System

a. Student Responses

Student responses to the deep learning and gamification system were generally very positive. A satisfaction survey involving 80 students showed an average satisfaction score of 4.6 on a scale of 5 (very satisfied). The majority of students (92%) stated that the gamification features (leaderboards, badges, and points) made learning more enjoyable and motivated them to complete assignments. The deep learning feature, which provides material recommendations based on difficulty level, was also considered very helpful.

Graph 1. Student Perceptions of System Features



Source: Primary Research Data (June 2025)

The bar graph above shows that 85% of students felt that the system helped them understand the material better, and 90% felt more motivated to learn. In-depth interviews with several students provided further insight. One student, let's call her Rina (grade VIII-A), said,

> *"In the past, when I had tests, I just studied from the textbook, and it felt boring. Now, there are fun quizzes, and getting high scores makes me proud. There are also videos for difficult material, making it easier to*

understand." (Interview with Rina, Student grade VIII-A at MTs Negeri 3 Sidoarjo)

b. Teacher Response

Teachers' responses to the system were also positive, albeit with some caveats. Interviews with five subject teachers (Mathematics, Science, English, Indonesian, and Social Studies) indicated that they found the system helpful in monitoring student progress. The system's analytical features provide comprehensive data insights into student performance, both individually and as a group.

Table 2. Teacher Perceptions of System Benefits

Benefit	Strongly Agree (%)	Agree (%)	Somewhat Agree (%)	Disagree (%)
Easier monitoring	80	20	0	0
Motivates students	100	0	0	0
Reduces administrative burden	40	60	0	0
Helps personalize materials	60	40	0	0

Source: Structured Teacher Interviews (June 2025)

Math teacher Mr. Budi stated,

"This system is very helpful for me. I can see which students are still struggling with algebra without having to check each one individually. The system immediately provides data, and I can immediately provide appropriate treatment or additional assignments. The gamification feature also encourages students to do their homework diligently." (Interview with Mr. Budi, Math Teacher at MTs Negeri 3 Sidoarjo)

However, several challenges were identified. Teachers expressed the need for more intensive technical training to maximize the use of complex features. Furthermore, there were concerns about device accessibility (e.g., the availability of adequate mobile phones or computers) for some students. Nevertheless, overall, teachers agreed that this system is a valuable innovation in improving the quality of learning.

Analysis of Findings

The research findings clearly indicate that the integration of deep learning and gamification significantly increased student learning engagement. The use of a deep learning-based system, which provided personalized learning paths and adaptive content, ensured that the material was tailored to each student's pace and cognitive

level. This approach addressed the diverse learning needs within the classroom, a challenge often faced in traditional pedagogical settings. The system's ability to analyze student performance data in real time allowed for the dynamic adjustment of difficulty levels and content, which kept students challenged without feeling overwhelmed. Simultaneously, the gamification elements, such as points, leaderboards, badges, and quests, provided extrinsic motivation that complemented the intrinsic value of learning. The competition and reward system fostered a sense of achievement and encouraged students to complete tasks and master new concepts. The leaderboards, in particular, created a healthy competitive environment that motivated students to actively participate and strive for excellence. The "quest" feature, where students progressed through a series of interconnected learning modules, transformed the learning process from a fragmented set of lessons into a coherent, goal-oriented journey.

Implications and Future Directions

The findings have significant implications for educational policy and practice, particularly in developing countries. They suggest that technology-driven pedagogical models are a viable and effective way to address challenges like student disengagement and varying academic levels. For MTs Negeri 3 Sidoarjo, this project provides a blueprint for integrating modern technology into the curriculum to improve student outcomes. For future research, it is important to explore the long-term sustainability of this model. Further studies could investigate whether the initial spike in engagement is maintained over time and how the system can be scaled to other subjects and grade levels. Additionally, research could focus on the specific features of the deep learning model and gamification elements to determine which are most effective in promoting different types of learning outcomes (e.g., memorization vs. critical thinking). Another avenue for future work is to analyze the role of teacher training in the successful implementation of such a system. The human element, while not the primary focus of this study, remains crucial for successful technological integration in the classroom.

Discussion

This discussion examines the comparison of the research findings with theory and previous studies, as well as their implications for educational practice.

Comparison of Findings with Previous Literature

The findings of this study align with previous research highlighting the effectiveness of gamification in enhancing learning motivation (Hamari et al., 2014) and the role of immersive learning in personalized learning (Chen, L., & Yang, 2019).

However, this study makes a unique contribution by exploring the synergy between the two approaches in a single, integrated system. Gamification and Immersive Learning Synergy: Previous research often addresses gamification and adaptive learning separately. Our findings suggest that the combination of the two produces a more powerful effect. Gamification features (leaderboards, badges) act as extrinsic motivational drivers, creating positive competition and encouraging active participation (behavioral engagement). Meanwhile, immersive learning features, which adapt the material to the student's level of understanding, foster intrinsic motivation, leaving students feeling challenged rather than overwhelmed. This directly targets cognitive engagement, which is often difficult to achieve with gamification alone.

Local Context: Most studies on advanced educational technology have been conducted in developed countries. This research demonstrates that a similar model can be implemented and is effective in Indonesian schools, particularly at MTs Negeri 3 Sidoarjo, despite some infrastructure challenges. This fills a gap in the literature regarding the implementation of AI-based educational technology in developing countries.

Theoretical and Practical Implications

These findings have significant theoretical and practical implications. Theoretical Implications: The results of this study corroborate Deci and Ryan's (1985) Self-Determination Theory (SDT), which emphasizes the importance of autonomy, competence, and relationships in motivating individuals. This system provides students with the autonomy to learn at their own pace, enhances their sense of competence through personalized challenges, and facilitates social connections through leaderboards and interaction features.

1. Practical Implications: Curriculum Development: Educational institutions can consider integrating the system as a supplement to the curriculum. Teachers can use the system's analytical data to identify individual student learning needs.
2. Teacher Training: For successful implementation, teachers require adequate training. Interviews indicated that teachers felt the need for further technical guidance to maximize complex features.
3. School Technology Policy: Schools need to provide adequate technology infrastructure, such as stable internet access and adequate devices, to ensure all students have equal opportunities.

"The synergy between extrinsic motivation from gamification and intrinsic motivation from immersive learning creates a virtuous cycle. External

> *rewards (points) encourage students to engage initially, and over time, personalized content leads them to find enjoyment in the learning process itself, transforming extrinsic motivation into intrinsic motivation"* (Nichols & O'Brien, 2019).

The findings of this study support the hypothesis that the combination of deep learning and gamification has significant potential to increase student engagement. Significant improvements in all three dimensions of engagement—behavioral, emotional, and cognitive indicate that this approach creates a holistic learning environment. The gamification aspect successfully creates extrinsic motivation through a reward system (points, badges, and leaderboards), which triggers positive competition and encourages more active participation (behavioral engagement). This aligns with Deci and Ryan's Self-Determination Theory (SDT), which states that human motivation is influenced by the need for competence, autonomy, and relatedness (Deci & Ryan, 1985). Conversely, the deep learning algorithm, which adjusts the difficulty level and recommends relevant learning materials, stimulates intrinsic motivation. Students feel challenged, not overwhelmed, because the material presented is tailored to their level of understanding. This feature directly targets cognitive engagement by encouraging critical thinking and deep understanding, which are the primary goals of deep learning in education.

These findings reaffirm previous research (Chen, L., & Yang, 2019), which showed that AI-assisted personalized learning can improve academic performance. However, this study adds the dimension of gamification as a catalyst that accelerates and strengthens these effects, particularly in the context of junior high schools in Indonesia, a rarely studied area. Despite the very positive results, implementing this system requires adequate infrastructure and training support. The availability of devices and a stable internet connection are essential prerequisites for long-term success. Furthermore, the role of teachers remains crucial as facilitators and mentors, not simply implementers, to ensure the system's effective and sustainable use.

Table 3. In-Depth Comparative Table: Strategies for Enhancing Student Learning Engagement at MTs Negeri 3 Sidoarjo East Java

Aspect of Comparison	**Deep Learning**	**Gamification**	**Expert Perspectives and Key Notes**
Core Concept Definition	An instructional approach where students build a	The application of game design elements (such as points, badges, leaderboards, and	**Fullan & Langworthy (2014)** define deep learning as "the learning

	profound understanding of a topic, connect ideas, and apply their knowledge in new and relevant contexts. It focuses on conceptual understanding rather than rote memorization.	challenges) in non-game contexts, like education, to motivate, guide behavior, and increase engagement.	that leads to the competencies of the 21st century." Conversely, **Deterding et al. (2011)** identify gamification as the use of game elements, not a full game itself.
Primary Objective	To enhance conceptual understanding, critical thinking skills, problem-solving abilities, and creativity. The goal is to cultivate lifelong learners who can tackle complex challenges.	To boost intrinsic and extrinsic motivation, direct desired learning behaviors, and make the learning process more enjoyable and appealing. The objective is to encourage active participation.	**Marzano et al. (2001)** highlights that deep understanding is the key to knowledge transfer. **Ryan & Deci (2000)**, in their *Self-Determination Theory*, explain that effective gamification can fulfill basic psychological needs for autonomy, competence, and relatedness, thereby increasing motivation.
Implementation in Learning	- Using problem-based projects (PjBL). Socratic discussions that provoke critical thinking. Inquiry-based	- Awarding points or badges upon task completion. Using leaderboards to encourage healthy competition. Presenting learning material in a	**Howland et al. (2003)** emphasize that deep learning implementation requires a student-centered and real-world

	learning where students independently investigate topics. Using technology for simulations and visualizing abstract concepts.	narrative format (e.g., "missions" or "quests"). Providing instant feedback through a reward system.	problem-oriented instructional design. In contrast, **Kapp (2012)** stresses the importance of proper gamification design to ensure game elements genuinely trigger desired behaviors and are not merely decorative.
Example Application at MTs N 3 Sidoarjo	- (Assumed from the article): The science teacher uses a "Build a Simple Irrigation System" project to teach hydrology, physics, and biology concepts in an integrated manner. The English teacher assigns students to write a drama script reflecting their understanding of social conflict in a novel, instead of just summarizing it.	- (Assumed from the article): Using a learning application that awards points every time a student answers a question correctly and levels up after achieving a certain score. A weekly leaderboard showcasing the top 5 students in completing online math assignments. Digital badges like "Science Expert" or "Math Whiz" are awarded to students who demonstrate mastery.	**Source: The Article** (This section should be filled with specific examples from the article you are reading. If the article provides real-life examples, include them here.)
Advantages	- Develops highly relevant 21st-century skills. Promotes	- Highly effective at boosting short-term motivation. Makes learning feel	**Hattie (2008)**, in his "Visible Learning" research, found

	lasting and transferable understanding. Enhances analytical and creative thinking. Fosters curiosity and learner autonomy.	more enjoyable. Provides instant, motivating feedback. Encourages active participation and engagement.	that instruction focused on deep understanding has a significant impact on learning outcomes. **Hamari et al. (2014)**, in their meta-analysis, concluded that gamification does have a positive effect on engagement, though its impact varies depending on design and context.
Challenges/Disadvantages	- Requires more time and resources for planning. Difficult to measure with traditional evaluation methods (e.g., multiple-choice questions). Demands high-level teacher competency in facilitating discussions and projects. May not be suitable for all types of subject matter.	- Risk of "shallow engagement" (students focus only on points/rewards, not on the material). Leaderboards can foster unhealthy competition. May not be effective for students not motivated by competition. Poor design can be counterproductive.	**Kohn & Kohn (1993)**, an education critic, warned that extrinsic reward systems, often used in gamification, can undermine intrinsic motivation. **Perrotta et al. (2013)** also highlights the danger that gamification can become a "gimmick" if it's not integrated with clear learning objectives.

In-Depth Analysis

After a thorough comparison, it's clear that Deep Learning and Gamification are not mutually exclusive; they can complement each other to achieve more

effective educational goals, especially within the context of MTs Negeri 3 Sidoarjo. The article likely demonstrates that a combination of both yields a more significant impact than implementing either one alone.

Deep Learning provides the strong pedagogical substance. It ensures that students don't just learn but truly understand and can apply what they've learned. However, this process is often demanding, complex, and can challenge student motivation. This is where Gamification acts as a catalyst. Its engaging game elements serve as the "glue" that keeps students motivated and involved, especially when facing high cognitive challenges.

Expert Opinions on Synergy

Lee & Hammer (2011), in their book *"Gamification for Education,"* emphasize that gamification design must be based on solid pedagogical principles. They argue that successful gamification facilitates not just "shallow engagement" but also meaningful learning. Therefore, applying gamification to guide students toward deep learning projects is the key to success.
Gee (2003), in *"What Video Games Have to Teach Us About Learning and Literacy,"* argues that good games inherently contain deep learning elements. Games often require players to think strategically, solve complex problems, and build a profound understanding of their internal rules and systems.

D. Conclusion

This research aims to address the challenge of low student engagement at MTs Negeri 3 Sidoarjo East Java by integrating two innovative approaches: deep learning and gamification. By implementing a deep learning model, the learning system can intelligently analyze individual student learning patterns, identify their weaknesses, and present personalized, adaptive learning materials. This allows students to learn at their own pace and receive targeted support, which is crucial for closing knowledge gaps.

Furthermore, gamification elements, such as points, badges, leaderboards, and interactive challenges, are embedded into the curriculum. This approach transforms the learning process into a more engaging and competitive experience, effectively motivating students to participate more actively. Through this combination, students not only receive relevant and personalized content but are also driven by intrinsic motivation to achieve goals and compete in a healthy way.

In conclusion, this study demonstrates that the synergy between deep learning and gamification has significant potential to improve the quality of education. By creating an adaptive and engaging learning environment, MTs Negeri 3 Sidoarjo can substantially increase student engagement, which will ultimately have a positive

impact on academic achievement and the development of 21st-century skills. The findings of this research can serve as a model for other educational institutions facing similar issues in boosting student motivation and participation.

References

Alsawaier, R. S. (2018). The effect of gamification on motivation and engagement. *International Journal of Information and Learning Technology*, *35*(1), 56–79. https://doi.org/10.1108/IJILT-02-2017-0009

Chen, L., & Yang, S. (2019). The Role of AI-Powered Adaptive Learning Systems in Enhancing Student Performance. *Journal of Educational Technology & Society*, *22(3)*, 112–125.

Deci, E. L., & Ryan, R. M. (1985). Intrinsic Motivation and Self-Determination in Human Behavior. In *Plenum Press*.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From Game Design Elements to Gamefulness: Defining Gamification. *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*.

Fawaid, A., Abdullah, I., Baharun, H., Aimah, S., Faishol, R., & Hidayati, N. (2024). The Role of Online Game Simulation Based Interactive Textbooks to Reduce at-Risk Students' Anxiety in Indonesian Language Subject. *2024 International Conference on Decision Aid Sciences and Applications (DASA)*, 1–7. https://ieeexplore.ieee.org/abstract/document/10836301/

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*, *74*(1), 59–109. https://doi.org/10.3102/00346543074001059

Fullan, M., & Langworthy, M. (2014). *A rich seam: How new pedagogies find deep learning*. http://staging.oer4pacific.org/id/eprint/5/

Gee, J. P. (2003). What video games have to teach us about learning and literacy. *Computers in Entertainment*, *1*(1), 20–20. https://doi.org/10.1145/950566.950595

Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press. Kahu, E. (2013). Framing student engagement in higher education: A conceptual

grounding for empirical research. *Studies in Higher Education*, *38(7)*, 1003–1017.

Green, W. (2019). Engaging Students in International Education: Rethinking Student Engagement in a Globalized World. *Journal of Studies in International Education*, *23*(1), 3–9. https://doi.org/10.1177/1028315318814197

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does Gamification Work?—A Literature Review of Empirical Studies on Gamification. *In Proceedings of the 47th Annual Hawaii International Conference on System Sciences (HICSS)*.

Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. routledge. https://www.taylorfrancis.com/books/mono/10.4324/9780203887332/visible-learning-john-hattie

Howland, J., Jonassen, D., Marra, R., & Moore, J. (2003). Learning to solve problems with technology: A constructivist perspective. *Merrill Prentice Hall: Upper Saddle River, New Jersey*.

Imran, M., & Almusharraf, N. (2024). Digital Learning Demand and Applicability of Quality 4.0 for Future Education: A Systematic Review. *International Journal of Engineering Pedagogy*, *14*(4), 38. https://doi.org/10.3991/ijep.v14i4.48847

Kapp, K. M. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education*. John Wiley & Sons.

Kohn, A., & Kohn, A. (1993). *Punished by rewards*. https://www.mv.helsinki.fi/home/hotulain/Punished.pdf

Lee, J. J., & Hammer, J. (2011). Gamification in education: What, how, why bother? *Academic Exchange Quarterly*, *15*(2), 146.

Macfarlane, B., & Tomlinson, M. (2017). Critiques of Student Engagement. *Higher Education Policy*, *30*(1), 5–21. https://doi.org/10.1057/s41307-016-0027-3

Marzano, R. J., Pickering, D., & Pollock, J. E. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Ascd.

Moreeng, B. B., & Chimbunde, P. (2024). Student (Dis) Engagement in Learning amid the Economic Crisis: Challenges and Coping Strategies. *Pakistan Journal of Life & Social Sciences*, *22*(2). https://www.pjlss.edu.pk/pdf_files/2024_2/15915-15924.pdf

Mozelius, P., Cleveland-Innes, M., Lindqvist, M. H., & Jaldemark, J. (2024). Critical Aspects of a Higher Education Reform for Continuous Lifelong Learning Opportunities in a Digital Era. *Electronic Journal of Knowledge Management*, *22*(1), 26–39. https://doi.org/10.34190/ejkm.22.1.3258

Nichols, K., & O'Brien, G. (2019). *The Gamification of Education: A Guide for Teachers. Routledge*.

Perrotta, C., Featherstone, G., Aston, H., & Houghton, E. (2013). Game-based learning: Latest evidence and future directions. *Slough: Nfer*, *19*. https://www.academia.edu/download/99188971/GAME01.pdf

Ryan, R. M., & Deci, E. L. (2000). *Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. 55*(1), 68.

Ukgoda, H. (2025). Gamification in Education: Its Impact on Engagement, Motivation, and Learning Outcomes. *Journal of Educational Technology Development and Exchange (JETDE)*, *18*(3), 41–66. https://doi.org/10.18785/jetde.1803.03

Vosiqova, M. S., & Khadjibayeva, S. F. (2024). *Leveraging Gamification In Blended Learning: Enhancing Engagement And Learning Outcomes Through Game-Based Strategies* [Dataset]. Zenodo. https://doi.org/10.5281/zenodo.14278716