HUMANIS

Macro Fun Innovative Game Base For Teaching Macroeconomics

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Abstract: In the current era, smartphones and video games are primary sources of entertainment for the younger generation. To leverage this trend, the "Macro Fun" innovation aims to enhance students' macroeconomics knowledge through engaging gameplay. This educational game merges entertaining elements with learning, offering a creative approach to teaching macroeconomics in classrooms. Inspired by the popular game "Super Mario Adventures" and developed using Unity Software, "Macro Fun" is designed to provide a fun, interactive learning experience for Commerce Department studentsat Polytechnic Malaysia. In the game, students navigate obstacles and challenges, answering macroeconomics questions to progress. Correct answers determine their success, promoting both engagement and knowledge retention. A study on its effectiveness was conducted among second- semester students in the 2024/2025 session at Politeknik Sultan Salahuddin Abdul Aziz Shah,Politeknik Tuanku Sultanah Bahiyah, and Universitas Pamulang in Indonesia.The results showed that 54% strongly agreed the game enhanced their engagement, with 93.7% agreeing overall. For learning effectiveness, 57% strongly agreed it improved their understanding, with 96% in agreement. The game's visual and cognitive design received positive feedback, with 56.5% strongly agreeing and 96.5% overall agreement on its appeal and usability.These findings demonstrate the potential of "Macro Fun" to make macroeconomics learning enjoyable and effective, integrating gaming and education to enhance pedagogical approaches. The innovation successfully captivates students' interest and provides a modern tool for improving their understanding of macroeconomic concepts, making it a valuable resource for higher education institutions.

Keywords; Game-based learning,Macroeconomics education,Student engagement, Fun Learning

INTRODUCTION

The conventional approach to teaching and learning, characterized by lectures and rote memorization, has long been the dominant method in educational systems. However, this traditional method often struggles to engage students effectively, particularly in subjects perceived as abstract or challenging, such as macroeconomics. Students in such settings frequently report difficulties in connecting theoretical concepts with practical applications, leading to reduced motivation and suboptimal learning outcomes (Sung & Hwang, 2020).

Additionally, conventional teaching methods are less effective in fostering critical thinking and problem- solving skills, which are essential for understanding complex economic principles (Zainuddin et al., 2021).The rapid advancement of technology and its integration into education have paved the way for innovative approaches,such as game-based learning (GBL), to address these challenges. GBL incorporates elements of gameplay into educational settings, creating interactive and immersive environments that encourage active learning (Hamari et al., 2020). In the context of macroeconomics, where students must grapple with multifaceted concepts like inflation, Gross Domestic Product, monetary and fiscal policies, such interactive tools have been shown to enhance comprehension and retention (Prensky, 2021). This study introduces "Macro Fun," a game-based learning innovation designed to address the limitations of conventional teaching methods in macroeconomics education. By combining engaging gameplay with structured learning objectives, "Macro Fun" aims to increase student motivation, foster better understanding, and bridge the gap between theoretical knowledge and practical applications.The research objectives of the "Macro Fun" innovation in macroeconomics education are as follows:

1. To evaluate the effectiveness of the 'Macro Fun' game in increasing student engagement in learning macroeconomics..

2. To assess the impact of visual and cognitive learning design on understanding complex macroeconomic concepts.

3. To identify challenges in implementing 'Macro Fun' and propose solutions for improvement.

4. To explore the potential integration of AI technology into 'Macro Fun' for personalized learning.

5. To investigate the alignment of game content with macroeconomics curriculum requirements

6. To propose the incorporation of advanced technologies like AR and VR to enhance the learning experience.

These objectives are designed to connect the research findings with relevant steps for improvement and innovation in enhancing the effectiveness of game-based learning in macroeconomics education.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Game-based learning (GBL) has emerged as an innovative approach to enhance student engagement and academic performance. According to Anderson and Rainie (2020), by integrating gameplay with educational content, GBL provides an interactive and stimulating environment that facilitates a better understanding of complex topics. In addition, Zainuddin et al. (2021) highlighted the ability of educational games to

bridge theoretical and practical knowledge, a crucial element in fields like economics. Referencing Kim et al. (2022), the design of educational games plays a vital role in their effectiveness. Clear visuals, intuitive navigation, and engaging interfaces promote active learning by reducing cognitive overload and maintaining user interest. As stated by Hamari et al. (2020), gamified elements, such as rewards and feedback, enhance cognitive involvement, allowing students to apply theoretical concepts in interactive scenarios. In line with Sung and Hwang (2020), the integration of these principles into "Macro Fun" aligns with evidence suggesting that well-designed games improve academic performance in content-rich subjects like macroeconomics.

To support the use of game-based learning (GBL) in economics education, recent research underscores its effectiveness in enhancing engagement and learning outcomes. For instance, studies have shown that the interactive and immersive nature of games fosters a deeper understanding of economic concepts, particularly abstract topics like macroeconomics. Bai et al. (2020) highlighted that game-based environments increase student engagement and improve academic performance by maintaining focus and promoting active participation. Additionally, Kuo and Hsiao (2021) demonstrated that adaptive game elements allow students to progress at their own pace, which is crucial for complex subjects like economics.

The integration of role-playing games (RPGs), like those used in political economy courses, further emphasizes the benefits of GBL. By assuming different roles within simulated environments, students can better grasp the implications of economic policies (Nesti, 2017). Such games not only increase engagement but also make complex economic theories more accessible by providing real-world context (Hamari et al., 2016). This suggests that incorporating GBL into economics curricula could significantly enhance both learning engagement and retention, particularly for macroeconomic concepts.For a more comprehensive review of GBL applications, see Nesti (2017) and Chen et al. (2023), which detail its effectiveness in improving engagement and understanding in higher education contexts.

Motivation is a key driver in educational success. As shown by Sailer et al. (2021), gamification, which incorporates elements such as challenges and leaderboards, has been proven to increase both intrinsic and extrinsic motivation. This is especially relevant in macroeconomics, where sustained interest is crucial for grasping complex theories. Furthermore, Shi and Shih (2020) highlighted that immediate feedback mechanisms in games reinforce correct answers, aiding long-term knowledge retention and skill transfer.

Collaborative elements in educational games promote teamwork and communication, essential skills in real-world economic decision-making. Referencing Hamari et al. (2020), these aspects encourage students to work together, fostering key skills in collaboration. In addition, Chen et al. (2020) emphasized that adaptive learning technologies further enhance this experience by personalizing challenges and content to match individual skill levels. For example, Gee and Shaffer (2021) explained that games which dynamically adjust their difficulty ensure that students remain engaged while progressing at their own pace.

Building on the findings from previous studies, the researcher has created an innovative teaching tool in the form of a game, specifically designed for use by educators in teaching macroeconomics. This innovation aims to serve as a catalyst for making the subject more engaging and effective for students, so this study also aims to examine whether the results of this innovation contribute to improving teaching and

learning.

METHODS

The study utilizes a mixed-methods approach to evaluate the impact of the 'Macro Fun' game-based learning tool on students' understanding and engagement in macroeconomics. The methodology consists of two main phases: the development and deployment of the game, followed by the assessment of its effectiveness.

1. Development and Deployment

The 'Macro Fun' game, an educational adaptation inspired by "Super Mario Adventures" and created using Unity Software, incorporates interactive quizzes related to key macroeconomic concepts such as unemployment and inflation. The game is designed to support Android devices and aims to foster collaboration, critical thinking, and motivation among students.

The game includes multiple stages where players face challenges that require the application of macroeconomic knowledge. Students participated in the game as part of their coursework for the Macroeconomics module at several polytechnics, including Politeknik Sultan Salahuddin Abdul Aziz Shah, Politeknik Tuanku Sultanah Bahiyah, and Universitas Pamulang in Indonesia. Students were encouraged to play in groups to promote peer learning and collaboration.

2. Data Collection

To assess the impact of the game on learning outcomes and engagement, two methods were used: **Surveys**: A questionnaire adapted from Dr. Mohamad Siri Bin Muslimin's study on mobile learning applications was used to gather students' feedback on the effectiveness of the 'Macro Fun' game. The survey was conducted online and included 63 participants from the three institutions.

Observational Data: Teachers observed students during gameplay, focusing on their engagement, participation, and ability to connect theoretical knowledge to practical applications.

3. Data Analysis

The data collected from the surveys was analyzed quantitatively to determine students' overall satisfaction, engagement, and understanding. Descriptive statistics were used to assess the distribution of responses across different areas, such as visual design, interactivity, and alignment with learning objectives. Observational data was qualitatively analyzed to gain insights into student behavior and attitudes during the game.

RESULT AND DISCUSSION

The findings refer to the research objectives, which are as follows:

Table 1:

Student Engagement Levels

Response	Frequency	Percentage
Strongly Disagree	1	1.5%
Disagree	0	0.0%
Neutral	3	4.8%
Agree	25	39.7%
Strongly Agree	34	54.0%

1. **To evaluate the effectiveness of the 'Macro Fun' game in increasing student engagement in learning macroeconomics**.

   Survey results indicated that 39% of the participants agreed that the game increased their interest in learning macroeconomics, while 54% strongly agreed. The interactive elements of the game, including quizzes and level progression, fostered an environment conducive to active learning. The game provided a collaborative platform where students could explore macroeconomic concepts in a less formal, more engaging manner.

   Figure 1- 3;shows a graphical representation of student engagement levels based on survey responses. It highlights that the majority of students (93%) agreed or strongly agreed that the game enhanced their interest in the subject, while only 1.5% disagreed.
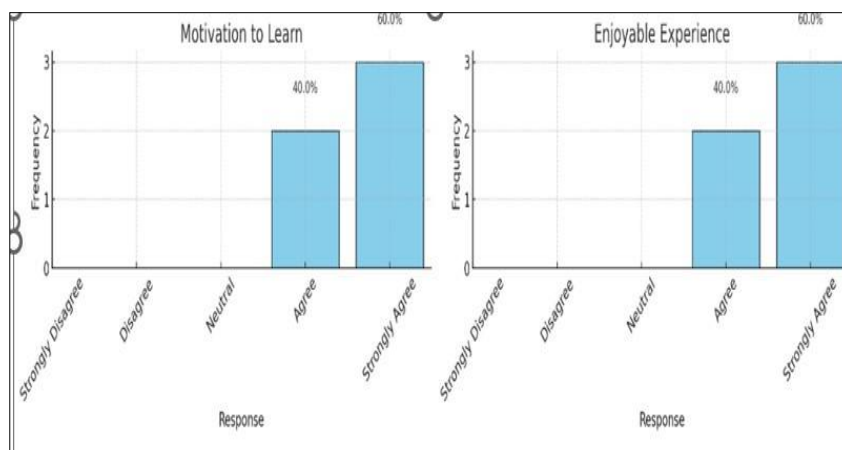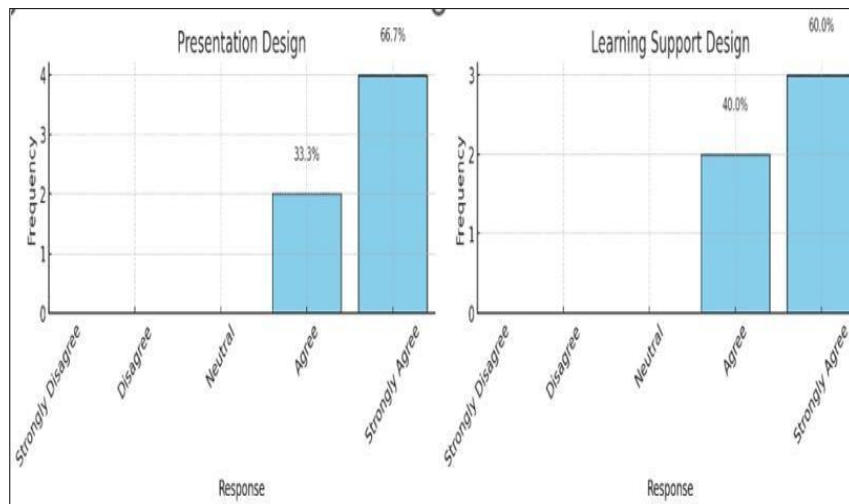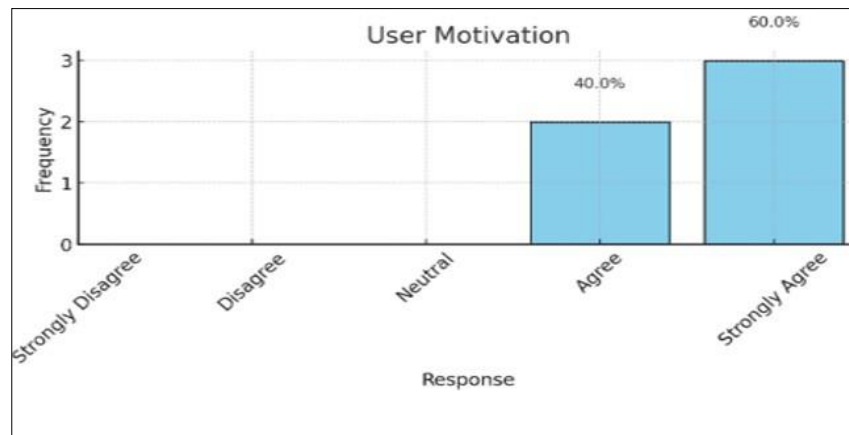

Figure 1;

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Figure 2

Figure 3

2. **To assess the impact of visual and cognitive learning design on understandingcomplex macroeconomic concepts**

The majority of participants (57% agreed, 39% strongly agreed) found the visual elements to be effective in helping them understand complex macroeconomic concepts, while 43% agreed and 56% strongly agreed that the content was well aligned with their curriculum. The cognitive learning activities embedded in the game allowed students to apply theoretical concepts, reinforcing their understanding through practice.

Table 2: Effectiveness of Learning Aspects

Aspect	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Visual Design	0%	1%	2%	35%	62%
Learning Support Design	0%	1.5%	5.5%	39%	54%
Cognitive Learning	0%	0%	5%	42%	53%

Teachers observed that students were more engaged during gameplay compared to traditional classroom lectures. The integration of game elements with theoretical knowledge enhanced students' ability to recall macroeconomic concepts and apply them in simulated real-life scenarios.

3. **To identify challenges in implementing 'Macro Fun' and propose solutions for improvement**

Some challenges were noted, such as limited access for iOS users and issues with variability in graphics quality. The game is currently only available for Android users, which limited participation and potentially skewed the sample of survey respondents. Future improvements include expanding the platform compatibility to iOS and incorporating additional interactive features, such as augmented reality (AR) and virtual reality (VR), to further enhance the learning experience.

4. **To explore the potential integration of AI technology into 'Macro Fun' for personalized learning**.

Integrating AI into 'Macro Fun' could further enhance personalized learning experiences. AI can be used to analyze students' progress and adapt the level of difficulty according to individual needs, providing real-time feedback and a tailored learning path. This could help maintain engagement and ensure that students of varying abilities benefit equally from the game.

5. **To investigate the alignment of game content with macroeconomics curriculum requirement.**

The game content aligns well with macroeconomics curriculum requirements, with high engagement (93.7%) and learning effectiveness (96%). The visual and cognitive design (96.5%) also supports understanding of economic concepts. Overall, the game meets curriculum objectives, though deeper policy simulations could improve alignment.

6. **To propose the incorporation of advanced technologies like AR and VR to enhance the learning experience** refer to the findings summarized in the overall data presented in the table 3 below, this current findings align with Chang et al. (2020), which showed that AR and VR enhance engagement and comprehension of abstract concepts. With high engagement (93.7%) and positive feedback on visual design (96.5%), this study suggests that integrating AR and VR could further improve understanding of macroeconomic concepts by providing interactive and immersive learning experiences.

Table 3: Overall Survey Results

Aspect	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Engagement	1.5%	0%	4.8%	39.7%	54.0%
Learning Effectiveness	0%	1%	3%	39%	57%
Visual and Cognitive Design	0%	0.5%	3%	40%	56.5%

Table 3; Diisplays the overall survey results, showing high satisfaction with the 'Macro Fun' inovation game and its role in supporting macroeconomic education. The graphical representation helps to visually confirm the positive reception and effectiveness of the game.

The survey results presented in Figures 1, along with Tables 1, 2, and 3, provide a comprehensive understanding of student engagement and learning effectiveness while using the 'Macro Fun' game. The data demonstrates that a large majority of students found the game to be both engaging and effective in helping them understand macroeconomic concepts.The graphical representation of student engagement indicates that nearly all students were either in agreement or strong agreement regarding the benefits of the game in enhancing their interest in macroeconomics. Table 1 further breaks down these responses, showing that 54% of students strongly agreed and 39.7% agreed that the game was engaging. Only a very small percentage (1.5%) expressed negative feedback.

Similarly, Table 2 highlights that the effectiveness of the learning aspects was well-received, with more than 95% of students agreeing or strongly agreeing that the visual design, cognitive support, and alignment with learning goals were beneficial. This is supported by the observations made by teachers, who noted increased engagement compared to traditional teaching methods.

The overall survey results in Table 3 provide additional insight into the broad positive impact of the game across different dimensions, including engagement, learning effectiveness, and visual appeal. The consistent agreement across these areas points to the game being a well-rounded educational tool that supports different learning needs. The challenges highlighted, such as limited platform availability and variability in graphics, present opportunities for future improvements. Expanding platform compatibility and adding advanced features such as AR and VR could further enhance the learning experience and accessibility for a broader range of students.

CONCLUSIONS

The 'Macro Fun' game demonstrates considerable potential as an innovative tool for teaching macroeconomics. By gamifying the learning process, it enhances student engagement and provides a collaborative learning environment. The study highlights the significant potential of the Macro Fun innovation in enhancing macroeconomics education through game-based learning. Findings demonstrate that the majority of

students (93%) found the game engaging and effective in increasing their interest in macroeconomics. The integration of interactive elements, such as quizzes and level progression, successfully fostered active learning and improved comprehension of complex concepts.

Additionally, the visual and cognitive design of the game received positive feedback, with most respondents agreeing that it supported their understanding of macroeconomic theories. Teachers also observed greater student engagement compared to traditional classroom methods, emphasizing the role of gamified learning in creating an immersive and effective educational environment. However, challenges were noted, particularly regarding platform accessibility and graphics variability. These limitations suggest the need for future improvements, such as expanding compatibility to iOS and incorporating advanced features like augmented reality (AR) and virtual reality (VR). Moreover, integrating AI technology could provide personalized learning experiences, ensuring that students with varying abilities benefit equally.

In conclusion, Macro Fun demonstrates a promising approach to blending education and entertainment, aligning with curriculum objectives while fostering higher levels of engagement and understanding. Continuous development and incorporation of advanced technologies can further enhance its effectiveness, making it a valuable tool in modern macroeconomics education. However, further improvements are needed to expand its accessibility and enhance interactivity, ensuring that it can serve as an effective educational tool across diverse student populations.

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