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The Design and Development of FarmQuest as an Innovative Learning Media

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ABSTRACT
This study introduces *FarmQuest*, an innovative interactive board game designed to integrate mathematical reasoning, economic analysis, and agricultural business decision-making within a single experiential learning platform. Responding to the urgent need for engaging, context-based learning tools that bridge abstract mathematical concepts with real-world applications, the research employed the 4D development model—limited to the Define, Design, and Develop stages—to focus on prototype refinement and controlled validation. Expert evaluations by three specialists assessed content accuracy, instructional effectiveness, linguistic clarity, and visual presentation, yielding scores between 80% and 85%, thereby confirming the game's validity as an educational medium. Practicality testing involving 33 users produced an average score of 80.4%, indicating that *FarmQuest* is both intuitive and effective in fostering active learning. While 85% of participants readily comprehended the game mechanics and 80% appreciated its visual design, minor revisions were made to enhance clarity in transactional features. Although dissemination was not conducted due to logistical and curricular constraints, the study contributes a validated prototype that demonstrates the potential of analog game-based learning in promoting interdisciplinary understanding. Future research should extend to large-scale implementation, curriculum integration, and digital adaptation to ensure *FarmQuest*'s scalability and long-term educational impact.
Keywords: Educational Board Game, FarmQuest Development, Game-Based Learning, Learning Media Design, Simulation-Based Learning.

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Introduction

Education plays a critical role in shaping human resources, equipping individuals with knowledge, skills, and values essential for social, economic, and cultural development. However, despite global improvements in educational quality, students in Indonesia still face challenges in conceptual understanding and engagement due to traditional teacher-centered methods that emphasize passive information delivery (OECD, 2023). Traditional teacher-centered methods, which rely on passive information delivery, limit students' ability to engage in problem-solving, critical thinking, and independent decision-making (Wulandari & Nisrina, 2023; Zhang et al., 2020). In contrast, research has shown that active participation, collaboration, and inquiry-based learning significantly enhance knowledge retention and

comprehension, as students are directly involved in exploring concepts and constructing meaning through interaction (Amiruddin et al., 2023; Kooloos et al., 2020; Lu et al., 2025).

Game-based learning fosters student motivation, critical thinking, and real-world knowledge application through interactive and strategy-driven experiences (André, 2024; Emihovich, 2024; Matyakhan et al., 2024). By integrating simulation-based problem-solving, this approach immerses students in practical scenarios, helping them apply theoretical concepts effectively (Jufri et al., 2023; Ke et al., 2024; Koparan, 2022). While digital educational games have gained widespread attention, studies emphasize the importance of offline formats, particularly in regions where digital infrastructure remains limited (Kurniati et al., 2025; Kurniati, Lestari, et al., 2024; Liu, 2024; Yeboah et al., 2025).

Maluku Barat Daya (Southwest Maluku), designated as one of Indonesia's 3T regions (*Tertinggal, Terdepan, Terluar*) (Peraturan Presiden (Perpres) Nomor 63 Tahun 2020 Tentang Penetapan Daerah Tertinggal Tahun 2020-2024 (Indonesia), n.d.), faces significant educational challenges due to limited internet connectivity and resource distribution. As a result, schools rely on conventional teaching methods, which often fail to enhance literacy, numeracy, and engagement (Kementerian Pendidikan, 2016; Kurniati MA et al., 2024; Kurniati & Rumtutuly, 2025). Additionally, the lack of interactive and contextualized learning media contributes to students' difficulty in understanding abstract concepts (Agus et al., 2020; Ali et al., 2025; Novitasari, 2016). Without engaging visualizations, students struggle to relate academic theories to everyday life, reducing their learning motivation (Mohamad et al., 2023; Susanti et al., 2024; Tafonao, 2018).

To address these challenges, this research introduces FarmQuest, an offline game-based learning tool aimed at enhancing mathematical reasoning and farming-related knowledge. By adapting the Monopoly concept and incorporating farm simulation mechanics, the game provides contextualized learning experiences, reinforcing real-world economic and agricultural practices (Gazdula & Farr, 2019). Maluku Barat Daya's economic foundation in buffalo farming further validates this approach, as integrating farm-based simulations into game-based learning can improve academic engagement and problem-solving skills (BPS Kabupaten Maluku Barat Daya, 2023; Welerubun et al., 2023).

This study aims to develop and validate FarmQuest as a game-based learning tool that enhances student engagement, critical thinking, and problem-solving skills in mathematics and farming concepts. By offering an accessible, strategy-driven learning

experience, FarmQuest seeks to bridge the gap between academic theories and real-world applications, supporting student-centered learning in regions with limited digital access.

This study aims to develop and validate FarmQuest as a game-based learning tool that enhances student engagement, critical thinking, and problem-solving skills in mathematics and farming concepts. By offering an accessible, strategy-driven learning experience, FarmQuest seeks to bridge the gap between academic theories and real-world applications, supporting student-centered learning in regions with limited digital access. Through this approach, students will gain a deeper understanding of mathematical reasoning and agricultural principles, enabling them to apply their knowledge more effectively in both academic and real-life contexts (Ahmad et al., 2022; Widyastuti & Pujiastuti, 2014).

Methods

The population for this research consists of students in the Mathematics Education study program at Pattimura University. A sample of 33 students enrolled in the Mathematics Learning Strategies and Instructional Methods course during the 2024/2025 academic year was selected. The sampling method ensured that participants had relevant experience in evaluating learning media, providing valuable insights for validating FarmQuest's effectiveness as an educational tool.

Expert validation was conducted by three professionals from different educational backgrounds. The first validator is a lecturer in the Mathematics Education study program at Pattimura University, specializing in mathematical pedagogy and curriculum development. The second validator is a lecturer in Animal Science with extensive experience in conducting farm-based livestock research in Maluku Barat Daya, ensuring that FarmQuest's real-world applications in agricultural and resource management settings are relevant. The third validator is a lecturer in Educational Technology at the State University of Malang, specializing in instructional media design and digital learning integration. These experts independently assessed FarmQuest's content, design, language, and visual presentation based on predefined criteria, where a score above 60% indicated validity (Hodiyanto et al., 2020). Inter-rater reliability was calculated to ensure consistency among assessments.

This study adopted the 4D model (Define, Design, Develop, Disseminate) developed by Thiagarajan et al. (1974), a systematic framework for educational media development. Due to time and budget constraints, only the Define, Design, and Develop stages were implemented, focusing on need analysis, game mechanism design, and product validation within a controlled scope.

Define Stage

The Define Stage aimed to establish the educational foundation of FarmQuest, ensuring it serves as an effective and engaging mathematics learning tool. This phase involved literature studies, expert consultations, and game-based learning analysis to determine the learning goals, cognitive engagement strategies, and essential gameplay mechanics. By integrating research on educational board games and interactive learning, FarmQuest was designed to enhance mathematical problem-solving skills through an adapted Monopoly-style format, encouraging players to apply mathematical reasoning in a structured yet enjoyable way.

Additionally, the define stage explored common learning challenges in mathematics education, particularly in traditional instructional methods where engagement and conceptual understanding are often lacking. Recognizing the potential of gamification, researchers examined how visual elements, strategic decision-making, and real-world mathematical scenarios could be woven into gameplay to improve comprehension and motivation. These foundational insights informed the design stage, where game framework, rule structures, and interactive components were developed to align with both learning objectives and student engagement strategies.

Design Stage

The Design Stage focused on designing the core structure of FarmQuest, including its rules, components, and interactive elements. This phase established the gameplay framework, ensuring the mechanics aligned with mathematical learning objectives while maintaining an engaging and strategic experience. Inspired by Monopoly-style gameplay, FarmQuest incorporates structured decision-making and problem-solving elements to reinforce key mathematical concepts.

Researchers developed game components, including farm cards, challenge and surprise cards, and interactive game rules, to enhance player engagement and encourage critical thinking. The board layout and visual design were crafted using Canva, ensuring clear instructional layouts and intuitive gameplay visuals. Additionally, FarmQuest was optimized for offline play, allowing students in areas with limited internet access, such as Maluku Barat Daya, to participate in meaningful learning experiences without technological barriers.

Develop Stages

The Develop Stage focused on testing and validating FarmQuest to ensure its effectiveness as an educational board game. A prototype was created and assessed through structured observations, semi-structured interviews, and questionnaires, each designed to measure usability, engagement, and alignment with mathematical

learning objectives. To ensure clarity and reliability, these instruments underwent a pilot phase before formal implementation.

Table 1. Validity Criteria

Average percentage score of validation results	Criteria
$80\% < score \leq 100\%$	Highly Valid
$60\% < score \leq 80\%$	Valid
$40\% < score \leq 60\%$	Quite Valid
$20\% < score \leq 40\%$	Invalid
$0\% < score \leq 20\%$	Very invalid

Source: (Hodiyanto et al., 2020)

Semi-structured interviews were developed based on educational game evaluation frameworks, incorporating open-ended questions to gather insights from expert validators and students. A preliminary trial refined the questions to enhance data collection on usability, engagement, and learning effectiveness. Meanwhile, structured observations employed checklists to systematically assess student interactions and problem-solving approaches, reviewed by experts for evaluation consistency.

Questionnaires measured user experience, ease of play, and educational impact, utilizing a Likert scale for quantitative analysis. Before implementation, these instruments were piloted to ensure reliability and clarity. Expert validators independently assessed FarmQuest using predefined validity (Table 1) and practicality criteria (Table 2). The game achieved a validity score above 60% and a practicality score exceeding 60%, confirming its feasibility for educational use.

Table 2. The criteria for practicality

Average percentage score of practicality results	Criteria
$80\% < score \leq 100\%$	Highly practical
$60\% < score \leq 80\%$	Practical
$40\% < score \leq 60\%$	Quite practical
$20\% < score \leq 40\%$	Inpractical
$0\% < score \leq 20\%$	Very Inpractical

Source: (Hodiyanto et al., 2020)

Inter-rater reliability was evaluated through percentage agreement, ensuring statistical consistency among assessments. Descriptive statistics identified areas for improvement, leading to refinement in game framework, design elements, and instructional content to enhance its effectiveness. As this study did not include the Disseminate Stage, future research should focus on broader field trials, teacher training, and large-scale implementation to explore FarmQuest's long-term impact on mathematics education.

Result and Discussions

Results of Define Stage (Learning Needs Analysis)

The Define Stage aimed to establish the educational foundation of FarmQuest, ensuring it serves as an effective and engaging mathematics learning tool. This phase involved literature studies, expert consultations, and game-based learning analysis to determine learning goals, cognitive engagement strategies, and essential gameplay mechanics. By integrating research on educational board games and interactive learning, FarmQuest was designed to enhance mathematical problem-solving skills through an adapted Monopoly-style format, encouraging players to apply mathematical reasoning in a structured yet enjoyable way.

Mathematics learning continues to rely heavily on conventional instructional methods that emphasize passive delivery of information. Studies have consistently shown that such methods limit students' ability to engage meaningfully with problem-solving and abstract mathematical concepts (Wulandari & Nisrina, 2023; Zhang et al., 2020). Discussions with teachers reinforce these concerns, highlighting the difficulties in fostering interactive and contextualized learning due to the absence of game-based or simulation-driven approaches. Research indicates that active participation, rather than passive instruction, significantly improves knowledge retention and comprehension, as students construct meaning through inquiry-based interactions (Amiruddin et al., 2023; Kooloos et al., 2020).

Recognizing these challenges, the Define Stage explored common learning obstacles in mathematics education, particularly within traditional instructional frameworks. Gamification has emerged as a promising solution, with studies demonstrating its ability to foster motivation, critical thinking, and cognitive engagement (André, 2024; Emihovich, 2024). A Monopoly-style rules framework was adopted for FarmQuest, ensuring strategic decision-making, resource management, and interactive problem-solving align with mathematics learning objectives. Existing research on game-based education has shown that structured gameplay mechanics enhance cognitive processing and improve real-world mathematical applications (Gazdula & Farr, 2019; Koparan, 2022).

Previous studies also highlight the importance of incorporating visual elements, strategic decision-making, and real-world mathematical scenarios into gameplay to improve comprehension and motivation (Jufri et al., 2023; Ke et al., 2024). By integrating these principles into FarmQuest's framework, the game was designed to bridge the gap between theoretical knowledge and practical problem-solving experiences. The foundational insights gathered during this stage informed the Design

Stage, where the game's framework, rule structures, and interactive components were developed to align with both learning objectives and student engagement strategies.

Results of the Design Stage (FarmQuest Design)

The Design Stage focused on developing FarmQuest as a structured, interactive board game that reinforces mathematical reasoning through engaging gameplay. Findings from the Define Stage shaped the development of the game system, ensuring that decision-making, problem-solving, and resource management elements align with mathematics learning objectives. Unlike conventional teaching approaches, which often rely on passive instruction and theoretical problem-solving, FarmQuest provides an experiential learning environment that immerses students in practical applications. FarmQuest is designed with a farming theme, where players navigate land ownership, business transactions, and financial strategies in an applied learning environment. The board consists of farms, a transaction system, and designated areas for challenge and surprise cards (Figure 1). Each player begins with Rp 200,000, using their funds to acquire land, build farms, and make strategic financial decisions. Movement is determined by dice rolls, allowing players to land on farms, challenge cards, or surprise cards, each influencing gameplay progression. This dynamic approach contrasts with static problem-solving exercises in traditional mathematics instruction, enhancing engagement and decision-making skills.

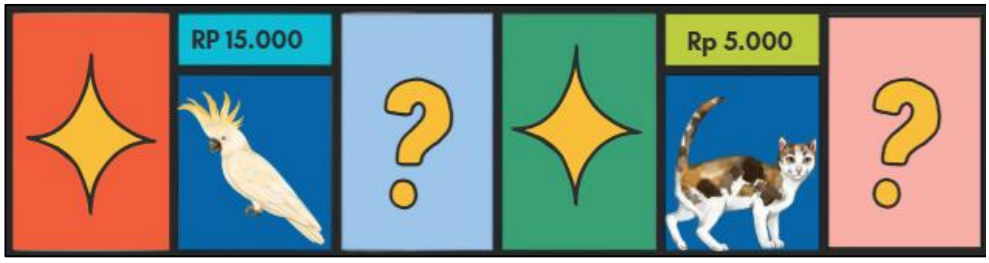

Figure 1. Part of the board game layout, showing farms, transaction spaces, and card zones

To facilitate smooth gameplay, FarmQuest includes a structured game instruction interface (Figure 2) that outlines the game's goals, preparation steps, and additional rules to support clear decision-making. This system helps players understand their objectives and organize their resources efficiently before the game begins. Through clear instructions, players can effectively navigate problem-solving scenarios and make well-informed strategic choices during gameplay. The integration of real-world scenarios ensures students develop practical financial literacy skills, an area often overlooked in conventional methods.

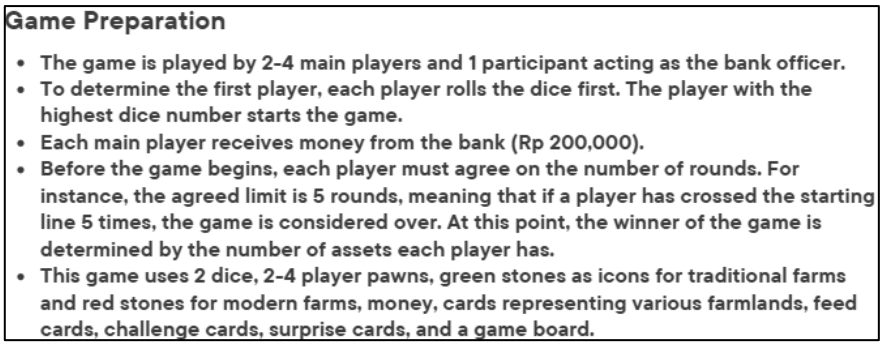

Figure 2. The game instruction interface

The game incorporates three primary card types: farm cards, challenge cards, and surprise cards (Figure 3). Farm cards represent land ownership, detailing purchase costs and rental fees. Challenge cards introduce academic questions related to mathematics, economics, and animal farming, rewarding correct answers or imposing penalties for incorrect responses. Surprise cards simulate real-world economic events that impact player assets, introducing scenarios such as investment opportunities, rising operational costs, or farm failures. Business transactions allow players to negotiate property sales and financial strategies, fostering an experiential learning approach. These elements distinguish FarmQuest from traditional mathematics learning by embedding complex financial decision-making within a simulated economic system, providing students with relevant, hands-on experience.

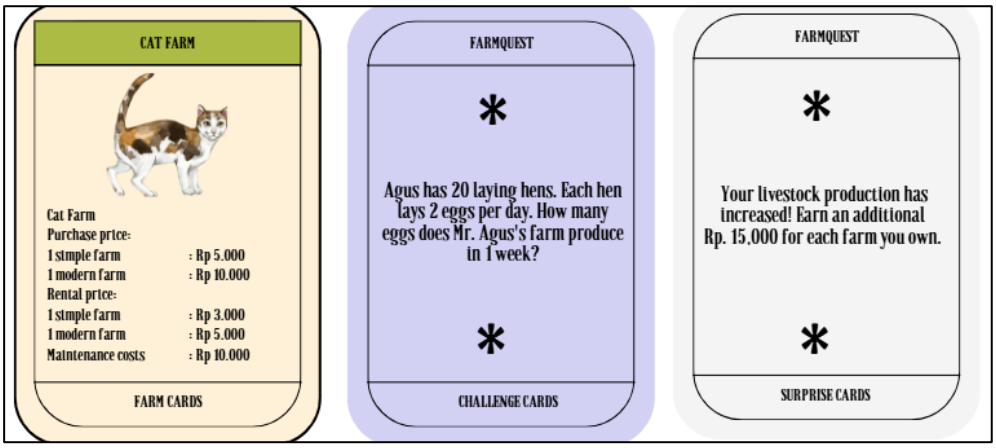

Figure 3. The card designs, including farm cards, challenge cards, and surprise cards (English version)

FarmQuest is designed to last a certain number of rounds, as agreed at the beginning of the game, such as 10 rounds. This rule allows players to optimize their business strategies to maximize profits, adding a competitive element to gameplay. If a player goes bankrupt before the game ends, they exit the game early. The structured competition and financial risks introduce students to real-world economic principles in a controlled, educational setting.

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The visual design of the game, including the board game layout, game instructions interface, and cards, was created using Canva, ensuring an intuitive and engaging layout that enhances student involvement. Color selections and design choices were carefully considered to make the rules and strategies of the game easier to understand. Designed for offline play, FarmQuest supports learning engagement in areas with limited technological access, such as Maluku Barat Daya, ensuring inclusive participation without digital barriers.

The structured system and dynamic interaction within FarmQuest provide an effective learning tool for mathematics education, addressing gaps in conventional teaching by integrating interactive learning with financial decision-making and agricultural economics. Unlike standard classroom exercises, FarmQuest ensures that students experience mathematical concepts through active gameplay, reinforcing comprehension and practical application. This Design Stage foundation supports the next phase, where game validation ensures its educational effectiveness.

Results of the Develop Stage (FarmQuest Development)

To ensure FarmQuest meets educational objectives and provides an engaging learning experience, expert validation was conducted, followed by a limited trial with student participants. The results guided refinements in content accuracy, game structure, and real-world applications. Three experts specializing in mathematics education, animal science, and educational technology provided structured feedback to refine FarmQuest's mechanics and instructional value. The Mathematics Education lecturer emphasized progressive difficulty levels in challenge cards, ensuring mathematical tasks advance in complexity to support students' problem-solving development. He further recommended time constraints for problem-solving, suggesting three minutes for lower-level questions and five minutes for advanced ones to maintain engagement and efficiency. To enhance accuracy, he advised including an answer key sheet held by the bank for structured verification of responses.

The Animal Science lecturer assessed the relevance of agricultural themes, ensuring the livestock and farm models accurately reflect real-world farming conditions. He recommended incorporating maintenance costs on farm cards, adding financial decision-making elements that simulate actual farm management challenges. Additionally, he advised revising certain animals in the board game to ensure they align with realistic agricultural practices and livestock management. To improve terminology accuracy, he suggested using "traditional farm" rather than "simple farm" to better represent agricultural practices. These adjustments strengthen the connection between game mechanics and practical livestock business strategies, helping students engage with realistic farm scenarios.

The Educational Technology lecturer provided visual refinement recommendations to improve clarity and usability. To enhance clarity, he recommended modifying colors, refining card layouts, and improving icons for better usability. Additionally, he proposed using contrast images on surprise cards to clearly differentiate their positive and negative effects. To reinforce farm investment dynamics, he encouraged integrating house-shaped pawns, green for simple farms and red for modern farms, to visually represent different development levels within the game. He also suggested changing the font type to improve readability.

The results of expert validation on the observation sheet show that FarmQuest is in the valid category but still needs minor revisions. The validation test results from three validators showed an average score that met the academic feasibility standards. Validator 1 gave an average score of 83%, validator 2 gave 85%, and validator 3 gave 80%. This means that overall, this media fulfills the validity threshold of ≥ 80% based on the criteria set. This score indicates that FarmQuest has fulfilled the aspects of content, design, language, and visual presentation, and is declared valid for use as simulation-based learning media.

To further ensure the reliability of expert assessments, inter-rater reliability was calculated to verify consistency by aligning assessments among validators. Using a Likert scale-based scoring system, validators assessed FarmQuest's content accuracy, instructional effectiveness, and visual clarity, with scores categorized according to predefined criteria.

The percentage agreement among expert evaluations was measured to determine the degree of consensus in validation results. The analysis showed a high agreement rate, confirming the reliability of expert judgments regarding FarmQuest's educational feasibility. This agreement supports the validity of the game as a simulation-based learning tool, ensuring that expert assessments were consistent across different evaluation criteria. With expert feedback confirming FarmQuest's validity, adjustments were made to further optimize its educational and gameplay experience. Based on expert suggestions, several refinements were made to enhance FarmQuest's educational and gameplay experience. The Animal Science lecturer evaluated agricultural themes, ensuring that the livestock models accurately represent real-world farming conditions. Following his recommendations, only animals categorized as livestock are included in the board game, while non-livestock animals have been replaced with other livestock species to ensure alignment with authentic livestock management practices. Additionally, farm cards, which initially included only purchase and rental prices, now incorporate maintenance costs, providing a more realistic perspective on farm management and financial decision-making. The

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terminology was adjusted to refer to "traditional farms" instead of "simple farms," strengthening its representation of agricultural practices.

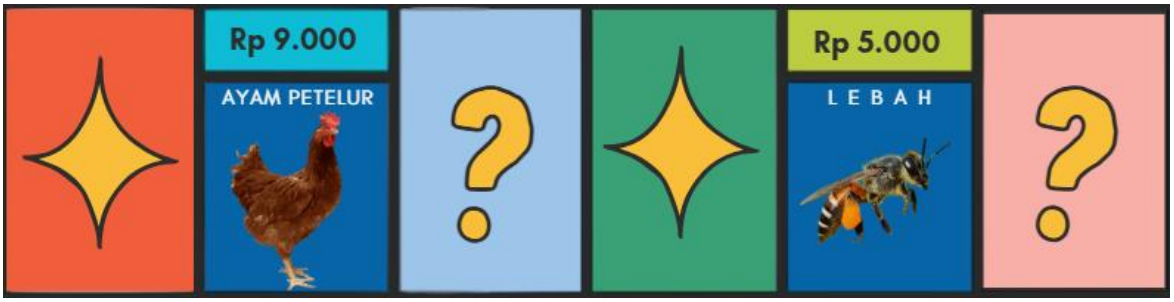

Figure 4. Revised layout of the board game

Challenge cards were redesigned with difficulty indicators using star symbols, where one star represents the easiest level and five stars the most challenging. To ensure structured learning, a time limit for responses was introduced, helping players engage with mathematical concepts efficiently. Surprise cards were improved with contrast images that differentiate positive and negative effects, making it easier for players to interpret the implications of various events. These enhancements create a more immersive, strategic, and educational gameplay experience, reinforcing both mathematical reasoning and agricultural relevance. The revised versions of these cards and board game refinements, including updated animal representations, are shown in Figure 4 and Figure 5. The integration of house-shaped pawns enhances gameplay by reinforcing strategic investment decisions. Players managing traditional farms receive greenhouse miniatures, while those developing modern farms obtain red house miniatures, visually representing their progression. This system ensures that investment choices are clearly reflected in game dynamics, allowing players to engage in realistic farm management scenarios.

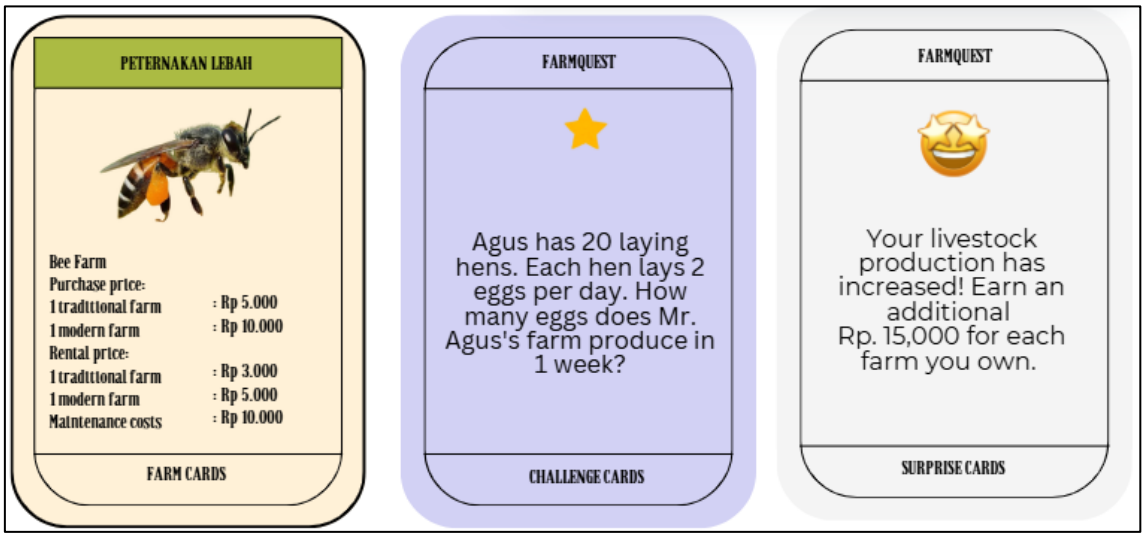

Figure 5. Revised farm cards, challenge cards and surprise cards

In addition, FarmQuest adopts the payment system used in the Monopoly game by implementing play money as the main transaction tool. This system not only facilitates structured financial transactions but also ensures that game rules are applied in a more concrete manner, including players' starting assets, the payment system when buying land, as well as the impact of challenge cards and surprise cards on the farm assets owned by players.

Table 3 summarizes user feedback collected during the trial phase, providing insights into players' experience with FarmQuest. To assess the practicality of the media, a limited trial was conducted using the revised version (as shown in Figure 6), which incorporated improvements based on validators' feedback. The findings indicate that 85% of students quickly grasped the game's rules and card functions, while 15% required additional guidance, particularly with farm transactions and surprise card effects. Meanwhile, the results of the player engagement test showed that 80% of students found the game design attractive and intuitive, while 20% stated that there needs to be adjustments to certain colors and icons to make the information easier to understand. With a combination of systematic rules and informative design, FarmQuest can serve as a simulation-based learning media that connects academic theories with real-world applications in the farm business.

Table 3. Summary of user feedback

Feedback Category	Percentage
Rule comprehension	85%
Engagement with gameplay	80%
Visual appeal	82%
Balance of game economy	70%
Difficulty level fairness	85%

In order to ensure that FarmQuest is relevant to the learning objectives and attractive to users, it is also necessary to conduct product testing to ensure that each player has the same opportunity to manage their business. The product testing showed that 70% of players felt that the farm transaction system was balanced enough, while the other 30% stated that the rental price needed to be adjusted to make modern farms more attractive to develop. Additionally, results showed that limiting the number of farms per player helped prevent excessive economic dominance, keeping the game competitive and challenging. Ensuring that all players have an equal level of involvement is crucial, as it directly impacts the flow of the game and students' learning outcomes (David Agwu & Nmadu, 2023).

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Figure 6. Limited trial of the revised version of FarmQuest

Beyond economic balance, ensuring a well-structured learning progression is equally crucial. The adaptation of difficulty levels in challenge cards plays a key role in helping users grasp mathematical concepts effectively. This refinement allows students to engage with increasingly complex problem-solving tasks while maintaining a fair and structured gameplay experience. The analysis showed that 85% of users felt that the difficulty level of the questions was well graded, while 15% found some of the final-stage questions overly complex. Evaluating question difficulty is essential, as it directly affects students' cognitive load and comprehension (Galeano & Gredebäck, 2024). Additionally, 82% of users stated that the visual design of the game was clear and informative, though some suggested modifications to the icons on challenge cards to better distinguish academic question categories. Students' interest in visual design must be considered, as it enhances attention, motivation, and focus, ultimately improving learning outcomes (Khumaedi et al., 2021; Meusel et al., 2024). To address this, additional clues were incorporated into more complex challenge cards, ensuring they encourage critical thinking without making the game overly complicated. Through this approach, FarmQuest is not just a game of chance but a learning tool that fosters strategic thinking and analytical skills in business decision-making.

However, despite these improvements, this study did not proceed to the Disseminate stage due to several key limitations. While expert evaluations confirmed the educational effectiveness and practicality of FarmQuest, its validation was conducted within a controlled setting, meaning that findings reflect initial feasibility rather than long-term impact in diverse learning environments. Large-scale trials with broader student populations have not yet been conducted, making wider implementation premature at this stage.

Additionally, successful dissemination requires logistical planning, institutional integration, and instructor training, which exceed the scope of this research. Without formal curriculum alignment and structured deployment, FarmQuest cannot yet be

applied in educational institutions on a large scale. Furthermore, the game has not undergone digital adaptation or mass production, limiting accessibility and preventing its widespread use. Given these constraints, this study intentionally stops at the Develop stage, focusing on refinement and validation rather than full-scale implementation. Future research should explore structured dissemination efforts, expanded trials, and digital development to assess FarmQuest's long-term effectiveness in real-world educational settings, ensuring it serves as a practical and scalable learning tool.

Based on the analysis above, it can be concluded that the practicality test results indicate FarmQuest is a highly practical learning tool, with an average practicality score of 80% across various evaluation aspects. The rule comprehension test showed that 85% of users quickly understood the game setting, while 15% required additional guidance, particularly in farm transactions and surprise card effects. In terms of game design, 80% of users found it visually appealing and intuitive, though 20% suggested improvements in color and icon clarity. The farm transaction system was deemed balanced by 70% of users, while 30% recommended price adjustments to make modern farms more attractive. Regarding challenge card difficulty, 85% of users agreed that the questions were appropriately structured, whereas 15% found some final-stage questions too complex, leading to refinements such as additional hints on harder challenge cards. These findings highlight that FarmQuest effectively integrates strategy and critical thinking, providing an engaging educational experience that connects academic theories with real-world applications in farm business.

The implementation of FarmQuest as an educational tool presents several meaningful implications in teaching and learning. By incorporating interactive and strategy-based learning, FarmQuest enhances student engagement and encourages critical thinking, problem-solving, and decision-making through practical simulations. This approach fosters higher motivation, as students actively participate in learning rather than passively receiving information. Additionally, FarmQuest offers flexibility in accessibility, functioning as an offline game that does not require digital infrastructure, making it suitable for regions with limited technological resources, such as Maluku Barat Daya. Furthermore, game mechanics and structure align with educational objectives in entrepreneurship, mathematics, and economics, allowing it to be integrated into school curriculums as a supplementary learning tool.

Compared to previous studies, which primarily focus on digital game-based learning (Avşar et al., 2023; Hidayat et al., 2024; Juliari et al., 2021; Kurniati, Inuhan, et al., 2024), FarmQuest introduces an offline, simulation-based board game, making learning more accessible in diverse educational settings. Unlike conventional studies that emphasize

broad implementation, this research provides structured validation and refinement, ensuring the game meets educational standards before dissemination. This study confirms previous findings on game-based learning's ability to improve engagement and learning effectiveness, while also addressing practicality and usability enhancements that were often overlooked in earlier research. Therefore, future research should focus on expanding trials and structured dissemination efforts to evaluate FarmQuest's long-term impact in real-world educational settings.

Conclusion

This research shows that FarmQuest was successfully developed as a simulation-based educational board game, which meets the validity criteria in terms of content, design, language, and visual presentation. The results of the expert validation test showed that FarmQuest was in the valid category, with scores from validator 1 of 83%, validator 2 of 85%, and validator 3 of 80%, thus fulfilling the set validity standard of at least 80%. In addition, the practicality test results showed that 85% of users were able to understand the function of the game cards after the first try, 80% of users found the game design attractive and intuitive, and 70% of users rated the farm transaction system as balanced. FarmQuest also met the user engagement aspect with 85% of users reporting that the difficulty level of the questions was well graded and 82% of users felt that the visual design was clear and informative.

Suggestions to implement FarmQuest widely, it needs to be developed in digital form, such as computer-based or mobile applications, so that users can play online and expand the scope of learning. In addition, integration in the education curriculum, particularly in mathematics, economics and entrepreneurship subjects, will ensure that the game can be used as a sustainable learning tool. Periodic evaluation is also needed to adapt the game to economic development and business strategies, so that FarmQuest remains relevant and effective as a simulation-based learning media.

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Author's Declaration

Author Contribution	:	Author 1: Conceptualization and Writing Original Draft Author 2: Writing - Review & Editing Author 3: Validation Author 4: Project administration Author 5: Project administration
Funding Statement	:	This study was conducted without financial support from any public, commercial, or non-profit funding agency.
Conflict of Interest	:	The authors declare no conflict of interest.
Additional Information	:	-

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