Universiti Teknologi MARA
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College of Computing, Informatics, and Mathematics
Universiti Teknologi MARA Cawangan Melaka, Kampus Jasin
77300, Merlimau, Melaka Bandaraya Bersejarah

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EDITORS

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PREFACE

Welcome to the inaugural volume of the **Progress in Computing and Mathematics Journal (PCMJ)**, a publication proudly presented by the College of Computing, Informatics, and Mathematics at UiTM Cawangan Melaka.

This journal represents a significant step in our commitment to fostering a vibrant research culture, initially providing a crucial platform for our undergraduate students to showcase their intellectual curiosity, dedication to scholarly pursuit, and potential to contribute to the broader academic discourse in the fields of computing and mathematics. However, we envision PCMJ evolving into a beacon for researchers both nationally and internationally. We aspire to cultivate a space where groundbreaking research and innovative ideas converge, fostering collaboration and intellectual exchange among established scholars and emerging talents alike.

The manuscripts featured in this first volume, predominantly authored by our undergraduate students, are a testament to the hard work and dedication of these budding researchers, as well as the guidance and support provided by their faculty mentors. They cover a diverse range of topics, reflecting the breadth and depth of research interests within our college, and set the stage for the high-quality scholarship we aim to attract in future volumes.

As editors, we are honored to have played a role in bringing this journal to fruition. We extend our sincere gratitude to all the authors, reviewers, and members of the editorial board for their invaluable contributions. We also acknowledge the unwavering support of the college administration in making this initiative possible.

We hope that PCMJ will inspire future generations of students and researchers to embrace research and innovation, to push the boundaries of knowledge, and to make their mark on the world of computing and mathematics.

Editors
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MONEY MASTER: A GAMIFIED APPS FOR FINANCIAL LITERACY

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Abstract

Learning about money is important, but it can be kind of hard for many people. This project, called MoneyMaster, tries to solve this problem by making a fun app to teach you about money in a game- like way. According to the study, most of the adult population lack the knowledge in financial literacy and lack of enjoyment causes them to carelessly keep track of their finances. MoneyMaster aims to change that. This project intends to create an application for android mobile phone that helps people understand money better and makes it fun to learn. The goal is to design a game-like interface about financial literacy, to develop a gamified application for financial literacy and to evaluate if this project provides an enjoyable approach and enjoyable experience in the gamified application for financial literacy. This project uses Agile Methodology as it is the most suitable to develop this application successfully. Three elements from MDA Framework are implemented in this project: mechanics, dynamics, and aesthetics. After making the app, the app is evaluated to see if people enjoy it and if it really helps them understand money better through questionnaire based on the Scale of EGameFlow. The results shows that the project scores high percentage of enjoyment, which is 84.40%. The finding suggests that the application succeeded in satisfying the third objective of MoneyMaster. Future work can be applied to the project by providing the option of multilanguage to the user.

INTRODUCTION

Research from Mitchell & Abusheva, (2016), states that 90% of their respondents says that personal finances classes are boring, expansive, and not widely available. This project addresses the crucial need for financial literacy, especially among young adults aged 18 to 29, by developing a mobile application called MoneyMaster. According to Adinda & Niwanputri, (2021), we need a solution that enables youngsters to get more financial literacy engagingly and enjoyably. This project utilizes gamification to make financial management enjoyable, focusing on budgeting, debt management, savings, and financial planning. Numerous earlier research has effectively demonstrated that player enjoyment can influence a game's performance and their ability to learn (Mohd Joharia et al., 2023). The app aims to provide users with an interactive and challenging experience while learning essential financial skills. By incorporating a game-like interface and scoring system, MoneyMaster intends to encourage users to track their expenses, stay within budget goals, and compete with others, ultimately fostering better financial habits and reducing the likelihood of future financial problems. This initiative aims to bridge the gap between practical financial education and enjoyable user experience, contributing to a more financially literate and responsible society.

LITERATURE REVIEW

Financial literacy plays a crucial role in modern society, significantly impacting individuals' overall quality of life life (Hoseiny & Niknafas, 2020). It encompasses a range of knowledge and skills necessary for making informed financial decisions. These include understanding how to use savings, credit, investments, debts, and spending (Sibi, 2021). With financial literacy, individuals can manage their finances more efficiently, set and achieve financial goals, and plan for the future. As stated by Chernovita, (2020), harm could be prevented if young people are prepared with financial literacy and do not succumb to the allure of satisfying consumptive rather than necessary emotional demands. It empowers people to make sound financial decisions, ultimately leading to greater financial stability and well-being.

Moreover, financial literacy is particularly essential in today's complex and dynamic financial environment. It enables individuals to navigate various financial challenges, such as managing debt, saving for the future, and planning for retirement. According to the research conducted by Hoffmann & Matysiak, (2019), most participants believed they lacked sufficient financial knowledge. By having a solid understanding of financial principles and practices, individuals can mitigate financial risks and make strategic financial choices. As stated by Vijayalakshmi et al., (2022), even if this rapid and enormous shift to a digitally active society is recognised as a great milestone, there has also been a considerable rise in "digital frauds". Additionally, financial literacy helps individuals avoid common financial pitfalls and make informed decisions about spending, saving, and investing.

Gamified Mobile Applications for Financial Literacy

According to Inchamnan et al., (2019), gamification might improve financial literacy by encouraging people to change their behaviours for a better financial life in the future. Gamified mobile applications offer a promising approach to promoting financial literacy in an engaging and interactive manner. The use of games and gamification techniques encourages people to get fully immersed with knowledge (Torres-Gastelu et al., 2022). By incorporating game elements such as challenges, rewards, and leaderboards, these applications make learning about personal finance fun and enjoyable. According to Hajarian & Diaz, (2021) reward-based gamification could enhance the marketability of applications. Gamification leverages the inherent human drive for competition, achievement, and rewards to motivate users to engage with financial concepts and develop essential financial skills.

Furthermore, gamified mobile applications provide several benefits for enhancing financial literacy. They increase user engagement by making learning more interactive and enjoyable, leading to higher participation rates and improved learning outcomes. Additionally, gamification encourages users to actively participate in financial activities and develop positive financial behaviors, such as budgeting, saving, and investing. By incorporating game elements, these applications create a dynamic and immersive learning experience that keeps users motivated and invested in their financial education.

Moreover, gamified mobile applications offer a scalable and accessible platform for delivering financial education to a wide audience. With the widespread availability of smartphones and mobile devices, these applications can reach individuals across diverse

demographics and geographical locations. They provide a convenient and flexible way for users to learn about personal finance at their own pace and convenience. By leveraging technology and gamification, these applications have the potential to democratize financial education and empower individuals to take control of their financial futures.

Analyzing the MDA Framework for Gamified Applications

According to Angelia & Suharjito, (2019), the MDA Framework (Mechanics, Dynamics, and Aesthetics) is a formal structure used to examine and comprehend gaming features. The MDA Framework offers a structured approach to analyzing gamified mobile applications for financial literacy. Mechanics refer to the tangible components and rules that govern how users interact with the application. It is a guide for players that obey the rules as indicated (Rukmono et al., 2021). The most popular gamification mechanics are still leaderboards and points (Limantara et al., 2020). In the context of financial literacy apps, mechanics may include budgeting tools, and financial calculators that engage users and facilitate learning.

Dynamics, on the other hand, encompasses the run-time behaviours that result from the combination of mechanics and player input are called dynamics (Rukmono et al., 2021). This includes factors such as user engagement, motivation, and feedback loops that drive user behavior and learning outcomes. By analyzing dynamics, developers can optimize the user experience and ensure that users remain engaged and motivated to continue learning about personal finance.

Finally, aesthetics refers to the emotional and subjective impressions that users experience while using the application. It defined as the player's emotional responses while playing the game (Rukmono et al., 2021). This includes elements such as visual design, storytelling, and audiovisual elements that enhance user enjoyment and satisfaction. By incorporating aesthetics into gamified financial literacy applications, developers can create a more immersive and engaging learning experience that resonates with users on an emotional level. Overall, by analyzing the MDA Framework, developers can design and optimize gamified applications to effectively promote financial literacy and empower users to make informed financial decisions.

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METHODOLOGY

The Agile methodology is well-suited for developing the gamified financial literacy app due to its iterative and flexible nature. Based on incremental and iterative releases, this model enables to continuously improve the system and add new characteristics and features (Saravanan et al., 2020). It allows for quick adaptation to changes in the financial landscape and client needs, ensuring the app remains relevant and effective. By breaking down the development process into short iterations or sprints, developers can regularly receive feedback from stakeholders and users, enabling them to make informed decisions and prioritize features based on real-time needs.

One advantage of using Agile for this project is its focus on early and continuous deployment of functioning software. This approach allows stakeholders to provide feedback on a working product at the end of each iteration, confirming assumptions and allowing for adjustments and improvements as needed. Additionally, Agile's iterative nature helps in risk management by identifying and addressing issues early on, potentially reducing setbacks during development.

Furthermore, Agile promotes value prioritization and user satisfaction. By continuously learning and improving throughout the development process, developers can incorporate user feedback, market trends, and emerging financial practices into future iterations of the app. This ensures that the app remains effective and relevant in supporting users in managing debt, savings, financial planning, and budgeting.

RESULT AND DISCUSSION

The evaluation of MoneyMaster using the Scale of EGameFlow revealed positive results across various aspects. In terms of concentration, respondents reported high levels of attention- grabbing elements and content stimulation within the game, leading to a mean score of 4.30. Goal clarity was also well-received, with clear presentation of overall and intermediate goals, resulting in a mean score of 4.4. Feedback mechanisms were effective, with respondents receiving timely and informative feedback on their progress and actions, achieving a mean score of 4.34.

The game provided appropriate challenges and assistance, with hints and auxiliary resources available to overcome challenges, leading to a mean challenge score of 4.28. Autonomy, however, received a more neutral response, with respondents feeling a moderate sense of control and impact over the game, resulting in a mean score of 4.1. Immersion was moderate, with respondents reporting varying levels of engagement and emotional involvement, resulting in a mean score of 3.84. Knowledge improvement aspects were generally positive, with respondents feeling motivated to integrate gained knowledge and wanting to learn more, achieving a mean score of 4.28.

The evaluation indicates that MoneyMaster performs well in terms of goal clarity and feedback, providing users with clear objectives and timely responses to their actions. However, aspects such as autonomy and immersion could be improved to enhance the overall user experience. Despite some areas for improvement, the overall mean percentage of enjoyment for MoneyMaster is high at 84.40%, indicating that users generally find the app enjoyable to use. Therefore, the project's third objective of creating an enjoyable app for financial literacy is achieved, highlighting the effectiveness of the gamified approach in engaging users and facilitating learning. Table 1 shows the score results from evaluation using Scale of EGameFlow.

Table 1: Scale of EGameFlow Score Results

Categories	**Total Mean**
Concentration	4.30
Goal Clarity	4.40
Feedback	4.34
Challenge	4.28
Autonomy	4.10
Immersion	3.84
Knowledge Improvement	4.28
Overall Mean	4.22
Overall Mean (%)	84.40

CONCLUSION

In conclusion, the mobile application MoneyMaster can assist users in properly managing the money they have with the tools that it's provided. It is an effective method to spread awareness to the young adult about the importance of financially literate. This indicates that it solves the lack of approach to manage financial with enjoyable way. Furthermore, after testing made by adapting the Scale of EGameFlow, this mobile application proves that it can make individuals content while managing their money. User feels that they can enjoy managing their finance while using the apps. This solves the lack of enjoyment in financial management. Overall, this mobile application achieved its goal of creating gamified apps for financial literacy that provide enjoyment while managing everyday finances. Aside from that, the project's limitations should be avoided or addressed in order to improve future research.

REFERENCES

Adinda, K. S., & Niwanputri, G. S. (2021). Designing for Financial Literacy: How Adolescent Learning through a Mobile Application. *Proceedings - 2021 8th International Conference on Advanced Informatics: Concepts, Theory, and Application, ICAICTA 2021*. https://doi.org/10.1109/ICAICTA53211.2021.9640262

Angelia, F., & Suharjito. (2019). Improving English Learning through Game Using 6–11 MDA Framework. *2019 12th International Conference on Information & Communication Technology and System (ICTS)*, 21–26. https://doi.org/10.1109/ICTS.2019.8850951

Chernovita, H. P. (2020). The Role of Financial Literacy to Suppress Temptation of Using PayLater Service. *2020 IEEE 10th Symposium on Computer Applications & Industrial Electronics (ISCAIE)*, 113–117. https://doi.org/10.1109/ISCAIE47305.2020.9108830

Hajarian, M., & Diaz, P. (2021). Effective Gamification: A Guideline for Gamification Workshop of WEEF-GEDC 2021 Madrid Conference. *Proceedings of 2021 World Engineering Education Forum/Global Engineering Deans Council, WEEF/GEDC 2021*, 506–510. https://doi.org/10.1109/WEEF/GEDC53299.2021.9657452

Hoffmann, G., & Matysiak, L. (2019). Exploring Game Design for the Financial Education of Millenials. *2019 11th International Conference on Virtual Worlds and Games for Serious Applications (VS-Games)*, 1–2. https://doi.org/10.1109/VS-Games.2019.8864517

Hoseiny, S., & Niknafas, A. (2020). Study of the Serious Games Capacity in Promoting Financial Literacy. *Proceedings of the 2nd International Serious Games Symposium, ISGS 2020*, 81–87. https://doi.org/10.1109/ISGS51981.2020.9375426

Inchamnan, W., Niranatlamphong, W., & Engbunmeesakul, N. (2019). Gamification-Driven Process: Financial Literacy in Thailand. *2019 17th International Conference on ICT and Knowledge Engineering (ICT&KE)*, 1–6. https://doi.org/10.1109/ICTKE47035.2019.8966885

Limantara, N., Meyliana, Gaol, F. L., & Prabowo, H. (2020). Mechanics, Dynamics, and Aesthetics Framework on Gamification at University. *2020 International Conference on Informatics, Multimedia, Cyber and Information System (ICIMCIS)*, 34–39. https://doi.org/10.1109/ICIMCIS51567.2020.9354271

Mitchell, J. W., & Abusheva, M. E. (2016). The actual challenges of financial literacy. *SHS Web of Conferences*, *28*, 01134. https://doi.org/10.1051/shsconf/20162801134

Mohd Joharia, N. F., Muhammad Ridzuan L, M. A. N., Ishak, N. H., & Zaini, H. (2023). Adopting the eGameFlow Model in an Educational Game to Increase Knowledge about Vaccination. *JOIV : International Journal on Informatics Visualization*, *7*(2), 338. https://doi.org/10.30630/joiv.7.2.1809

Rukmono, S. A., Zharfan Azif, F., & Catur Candra, M. Z. (2021). Designing an Educational Game Evaluation Framework Based on Game Mechanics. *2021 9th International Conference on Information and Communication Technology (ICoICT)*, 98–103. https://doi.org/10.1109/ICoICT52021.2021.9527418

Saravanan, T., Jha, S., Sabharwal, G., & Narayan, S. (2020). Comparative Analysis of Software Life Cycle Models. *Proceedings - IEEE 2020 2nd International Conference on Advances in Computing, Communication Control and Networking, ICACCCN 2020*, 906–909. https://doi.org/10.1109/ICACCCN51052.2020.9362931

Sibi, M. S. (2021). Intelligent Statistical Modeling and Approaches of Financial Literacy. *2021 7th International Conference on Advanced Computing and Communication Systems, ICACCS 2021*, 1685–1689. https://doi.org/10.1109/ICACCS51430.2021.9441675

Torres-Gastelu, C. A., Olguin-Barrera, A., & Angulo-Armenta, J. (2022). Perception of young university students on the acceptance of gamification in the learning process. *Proceedings - JICV 2022: 12th International Conference on Virtual Campus*. https://doi.org/10.1109/JICV56113.2022.9934320

Vijayalakshmi, R., Sudha, B., Farouk, M., & Ahmed, G. (2022). An Empirical Study of Association Among Financial Literacy, Financial Attitude and Financial Behaviour of Gen - Z. *International Conference on Cyber Resilience, ICCR 2022*. https://doi.org/10.1109/ICCR56254.2022.9996036

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