

“BAKSO BOSS”: Evaluating the Impact of Serious Games Using GDLC and FFFL-HS for Small and Medium Enterprises (SMEs)

Dimas Ramdhan^{1*}, Gede Bramanta Pandya Wisesa²

Game Application & Technology Program, Computer Science Departement,
School of Computer Science, Bina Nusantara University,
Jakarta, Indonesia 11480
dimas.ramdhan@binus.ac.id; gede.wisesa001@binus.ac.id

*Correspondence: dimas.ramdhan@binus.ac.id

Abstract – Small and Medium Enterprises (SMEs) are fundamental to economic growth, substantially aiding employment and income generation. Many SMEs face sustainability issues from deficient management and limited financial literacy, particularly in Indonesia (where they form ~99% of businesses and 95% of employment). Financial literacy—making informed financial decisions—is crucial for owners to manage resources and improve outcomes effectively. This study addresses this critical gap by evaluating the impact of "Bakso Boss," a serious game developed to enhance financial knowledge and business management capabilities among beginner entrepreneurs. The game, which simulates food business management scenarios to replicate typical challenges faced by small enterprises, was created using the structured Game Development Life Cycle (GDLC) method. Its effectiveness was rigorously assessed through pre- and post-tests administered to 30 respondents aged 16-30 in Jakarta who were either new or aspiring SME owners, utilizing the Financial Fitness for Life: High School (FFFL-HS) questionnaire. Data analysis using the Wilcoxon Signed Rank Test revealed statistically significant improvements ($p < 0.01$) across all assessed variables: General Financial Attitudes, Financial Self-Efficacy, Perceived Financial Behavioral Control, Financial Autonomy, and Financial Satisfaction. These findings strongly suggest that "Bakso Boss" effectively improves these essential skills in aspiring entrepreneurs. By linking game mechanics directly to real-world

financial behaviors, "Bakso Boss" improved test scores and equipped participants with practical, applicable skills. Future iterations could expand scenarios by including digital payment systems to reflect evolving SME challenges, thereby further enhancing the game's relevance and applicability in fostering SME development.

Keywords: Financial Education; Serious Game; Financial Literacy; Small Medium Enterprise

I. INTRODUCTION

Small and Medium Enterprises (SMEs) play a crucial role in Indonesia's economy, accounting for approximately 99% of all businesses and generating 95% of employment (Tambunan, 2019; Putra & Santoso, 2020). These enterprises contribute significantly to rural economic development, entrepreneurship, and workforce absorption. However, despite their prominence, many SMEs in Indonesia continue to face sustainability challenges, particularly due to inadequate capital, poor management practices, and a lack of managerial and financial literacy skills (Wardi & Putri, 2020; Mutamimah et al., 2021).

Financial literacy—defined as the ability to calculate, analyze, compare, and make informed financial decisions—is essential for business owners to manage resources, mitigate risk, and improve business outcomes (Sedyastuti et al., 2021; Hidayat, 2018). Traditional financial education, however, often

lacks engagement, especially among young or aspiring entrepreneurs. To address this, recent studies have begun exploring serious games as innovative tools for education, particularly in areas like entrepreneurship and financial management (Almeida, F. L. (2017). Serious games are designed not only for entertainment but also to convey knowledge and influence behavior in an interactive manner.

This study aims to examine the effectiveness of a serious game titled “Bakso Boss”, which was developed to improve financial literacy and business management skills among beginner entrepreneurs in Indonesia. The game was created using the Game Development Life Cycle (GDLC) method, ensuring a structured approach from concept to testing. To evaluate its impact, the Financial Fitness for Life: High School (FFFL-HS) questionnaire was administered to 30 respondents before and after gameplay. The data were analyzed using the Wilcoxon Signed Rank Test to assess the statistical significance of learning outcomes. Through this approach, the study seeks to contribute to evaluating on serious games using combination of GDLC and FFFL-HS as effective educational media for financial skill development in SMEs.

II. METHODS

2.1 Application Development

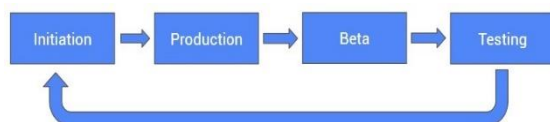


Figure 1. Game Development Life Cycle Flow Chart

- In the Figure 1 will start with initiation phase, the core themes and mechanics of the game will be determined. The process of determining the core themes and game mechanics focuses on how they are supposed to address the objectives of the implementation of the application. To this end, we have decided to develop a food business management simulator to replicate the problems that are typically faced by small and medium enterprises.
- The production phase is further broken down into several parts, these parts include pre-

production, production, and testing. In pre-production, we start detailing the game mechanics and concept art that will be used for the assets used in the game. The production phase starts with prototyping the game mechanics in the Unity game engine and creating all the art assets that will be used in the game and implementing those assets into the game. In the testing phase, we conducted usability tests to make sure that the game works as we intended. If there are any major issues found in the testing phase, then the game will be put back into production, after which we will re-conduct the usability test.

- In the beta phase, the application is further tested to collect feedback from potential users of the application. After receiving feedback, we will proceed to make further refinements to the application according to the feedback that we receive from potential users.

2.2. Research Method



Figure 2. Questionnaire Method Flow Chart

1. The Complete phase on the Figure 2 start with Research Design: The respondents for this research will be given a pretest questionnaire about financial management, after the respondents fill out the questionnaire, they will be given a chance to play our game for a period. Once the respondents have tried our game, they will be given a post-test questionnaire to assess the impact of our game on the respondents' financial management habits.
2. Respondents: In this study, we involved 30 people aged 16 - 30 in Jakarta who are about to or is freshly starting a Small Medium Enterprise.
3. Evaluation Method: The questionnaire that we have decided to use is based on "Improving Financial Literacy in Secondary School Students: A Randomized Experiment" (Zhu et al., 2021) with some

slight alterations. Respondents will give scores to assess the variables of respondents' financial knowledge. Respondents will choose a value between 1-5 with higher scores meaning a better representation of the variables. The questionnaire in this study assesses key variables related to financial literacy and behavior, starting with General Financial Attitudes (Q1 and Q2), which explore participants' awareness of expense tracking and budget adherence. Financial Self-Efficacy (Q3 and Q4) measures confidence in handling financial challenges and self-assessed management skills, while Perceived Financial Behavioral Control (Q5 and Q6) evaluates the ease of sticking to financial plans and maintaining bank balances. Financial Autonomy (Q7 and Q8) examines tendencies to research product prices and plan domestic expenses, and Financial Satisfaction (Q9 and Q10) assesses concerns about financial matters and payment difficulties. Together, these variables provide a comprehensive

III. RESULTS AND DISCUSSION

3.1. Serious Game Development Result

Bakso boss has several features that support the understanding of business management, such as calculating the capital costs that need to be spent by the player and estimating the profits that will be obtained from the capital, so players must be careful in spending their capital to get maximum profit. First, players will be given a User Interface in the form of an 'online shop' to spend their capital according to the needs required, such as the number of meatballs, vegetables, and so on. After preparing the ingredients to be used, players will enter the game and play several mini-games in the form of: preparing orders, calculating change, and cleaning meatball bowls. After the game is finished, players will be given a calculation of the profits they get that day, so that on the next day/stage players can adjust their capital and also customer desires, so that no ingredients are wasted and players can achieve maximum profit. The complete feature can be seen in Figure 3.

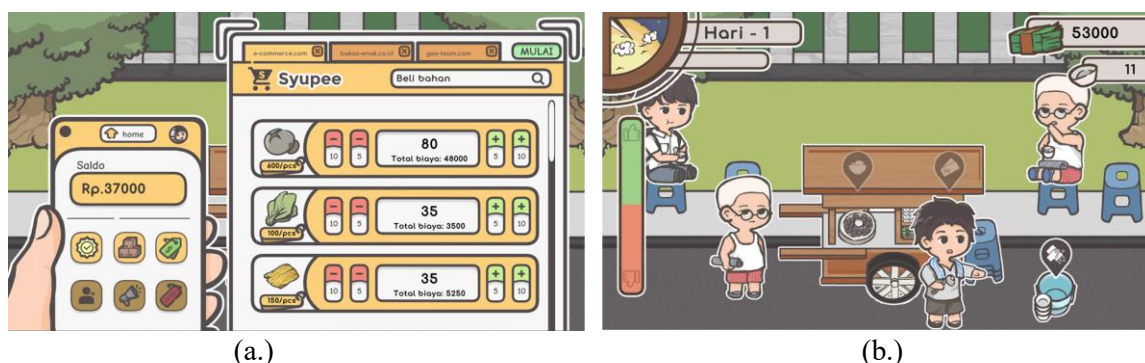


Figure 3. (a) Starting game User Interface. (b) Core gameplay

understanding of participants' financial attitudes, self-efficacy, control, autonomy, and satisfaction, essential for analyzing their financial behavior and literacy levels.

3.2. Evaluation Result

In this section, we administered pre-test and post-test questionnaires to 30 respondents. The questionnaires assessed variables such as General Financial Attitudes, Financial Self Efficacy, Perceived Financial Behavioural Control, Financial Autonomy, and Financial Satisfaction.

Respondents were instructed to complete a pre-test questionnaire, play the Bakso Bos game, and subsequently fill out a post-test questionnaire. This testing procedure was undertaken to evaluate the effectiveness of the Bakso Bos application as serious game.

The figure 4 and 5 show the results of both the pre-test and the post-test

questionnaires. On average, we can see a significant increase in scores for the General financial attitude, Financial self-efficacy, Perceived financial behavioural control, financial autonomy, and financial satisfaction variables. This increase signifies an improvement in the user's financial knowledge.

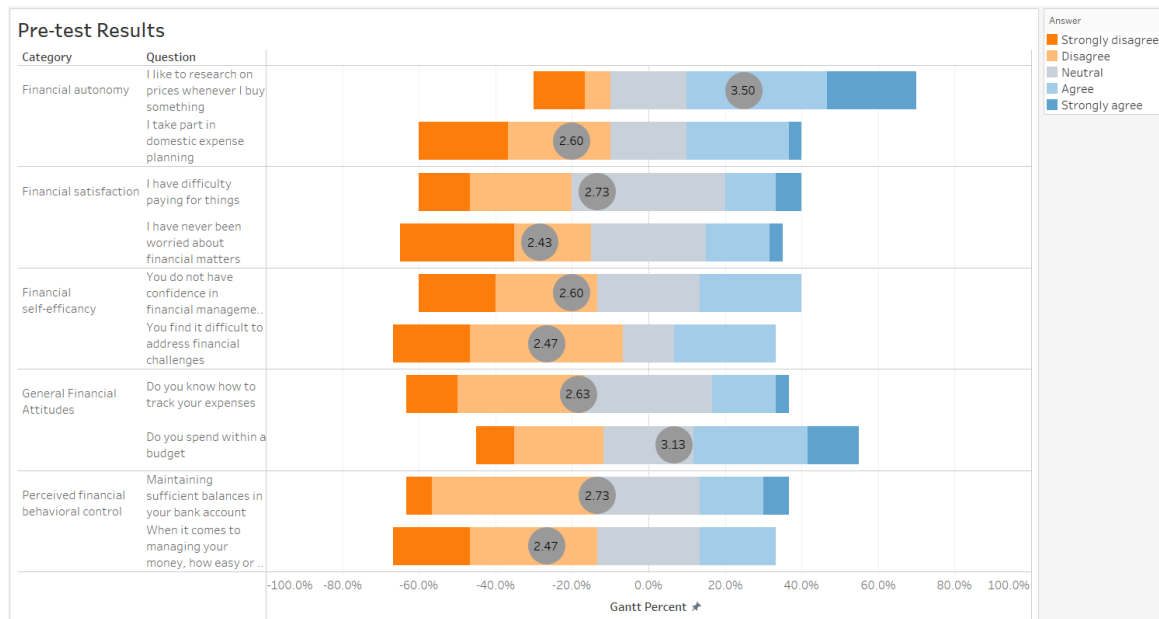


Figure 4. Pre-test result

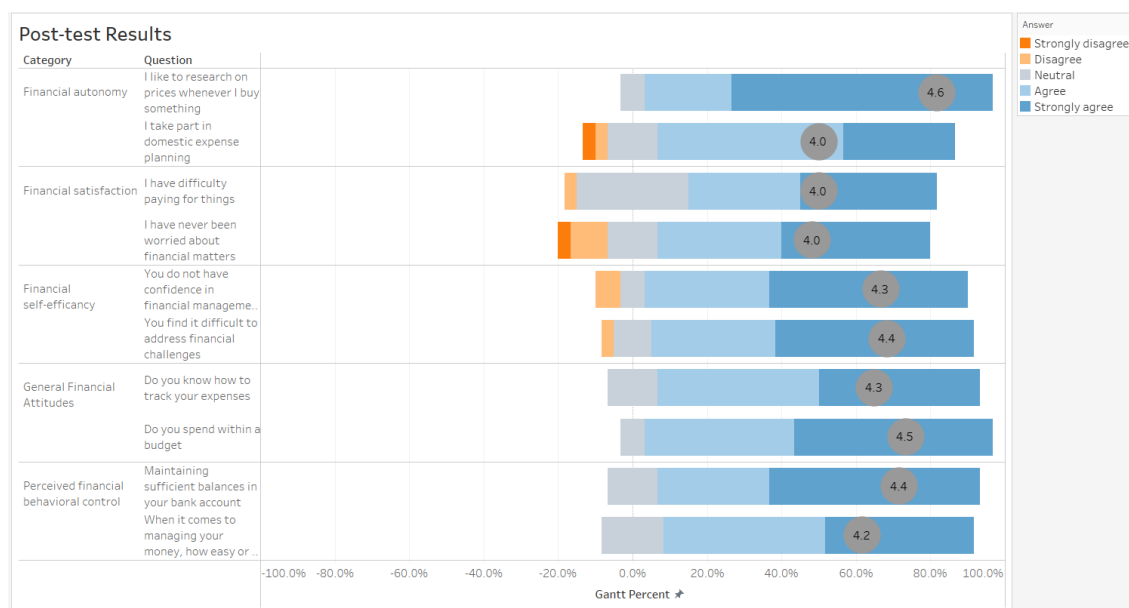


Figure 5. Pre-test result

a) *General financial attitudes (GFA AVG)*

An individual's general financial attitude, including aspects such as saving for the future, creating emergency savings plans, and developing long-term financial strategies, significantly influences the success or failure of their financial behavior (Zhu et al., 2021), (Ratnawati, K. et al, 2023).

After playing Bakso Bos, the users in the GFA AVG 2 group had higher scores for Outcome compared to the users before playing Bakso Bos in the GFA AVG 1 group. The p-value (<0.01) suggests strong evidence to reject the null hypothesis, indicating a significant difference between the two conditions; W-val = 0, z-val = -4.707, p-val = <0.01 .

b) *Financial self-efficacy (FSE AVG)*

Self-efficacy is defined as an individual's assessment of their ability to manage, control, and influence various aspects of their life (Zhu et al., 2021), (Asebedo, S., & Payne, P., 2019). After playing Bakso Bos, the user in the FSE AVG 2 group had higher scores for Outcome compared to the user before playing Bakso Bos in the FSE AVG 1 group. The p-value (<0.01) suggests strong evidence to reject the null hypothesis, indicating a significant difference between the two conditions; W-val = 6, z-val = -4.598, p-val = <0.01 .

c) *Perceived financial behavioral control (PFBC AVG)*

Perceived behavioural control describes an individual's assessment of the ease or difficulty of performing a specific behaviour, which can be affected by both past experiences and the anticipation of potential obstacles (Ratnawati, K. et al, 2023), (Nastasia, N., & Santoso, S., 2020)

After playing Bakso Bos, the user in the PFBC AVG 2 group had higher scores for Outcome compared to the user before playing Bakso Bos in the PFBC AVG 1 group. The p-value (<0.01) suggests strong evidence to reject the null hypothesis, indicating a significant difference between the two conditions; W-val = 0, z-val = -4.700, p-val = <0.01 .

d) *Financial autonomy (FA AVG)*

The ability of public higher education institutions to exercise control over their financial resources and seek alternative funding sources (Hayder, J. O., & Mohanad, H. Y., 2023).

After playing Bakso Bos, the user in the FA AVG 2 group had higher scores for Outcome compared to the user before playing Bakso Bos in the FA AVG 1 group. The p-value (<0.01) suggests strong evidence to reject the null hypothesis, indicating a significant difference between the two conditions; W-val = 8, z-val = -4.373, p-val = <0.01 .

e) *Financial satisfaction (FS AVG)*

Financial satisfaction stems from behaviors associated with managing income to satisfy fundamental necessities and establishing good financial well-being involves meeting both immediate consumption demands and long-term needs without any deficit (Hayder, J. O., & Mohanad, H. Y., 2023).

After playing Bakso Bos, the user in the FS AVG 2 group had higher scores for Outcome compared to the user before playing Bakso Bos in the FS AVG 1 group.

The p-value (<0.01) suggests strong evidence to reject the null hypothesis, indicating a significant difference between the two conditions; W-val = 2.5, z-val = -4.422, p-val = <0.01 , shown in Table 1.

Table 1. Questionnaire Result

			Negative ranks		Positive ranks		Zero ranks		Test Statistics		
			n	Sum ranks	n	Sum ranks	n	Sum ranks	W-val	z-val	p-val
(GFA	AVG	1)-(GFA AVG 2)	26	455	0	0	4	10	0	-4.707	<0.01
(FSE	AVG	1)-(FSE AVG 2)	27	454	1	8	2	3	6	-4.598	<0.01
(PFBC	AVG	1)-(PFBC AVG 2)	26	455	0	0	4	10	0	-4.700	<0.01
(FA	AVG	1)-(FA AVG 2)	24	439	2	16	4	10	8	-4.373	<0.01
(FS	AVG	1)-(FS AVG 2)	23	435.5	1	8.5	6	21	2.5	-4.422	<0.01

IV. CONCLUSION

In this paper we have presented how implementations of serious games can be used as a medium to teach financial management and business skill development. "Bakso Boss", the application that we used for this research has proven that serious games can improve financial management skills based on the increase in score averages after playing the game. Furthermore, based on the Wilcoxon Signed Rank Test the improvement in scores shown in the paper are already statistically significant for "Financial self-efficacy", "Perceived financial behavioral control", "Financial autonomy", "Financial satisfaction" variables tested in this research, proving the efficacy of "Bakso Boss" to be used in learning business skill development.

The results of this research show statistically significant results for using "Bakso Boss" as serious game in business skill development, it is also true that the game can affect an individual's financial management and business development skills based on the average increase in scores. In the future, further developments in application and research can further examine the impacts of serious games on business skill development.

By linking game mechanics to real-world financial behaviors, "Bakso Boss" not only improved test scores but also equipped participants with practical skills. Future iterations could expand scenarios (e.g., digital payment systems) to reflect evolving SME challenges, further enhancing the game's applicability.

REFERENCES

- Almeida, F. L. (2017). Experience with entrepreneurship learning using serious games. *Kıbrıslı Eğitim Bilimleri Dergisi*, 12(2), 69-80.
- Anastasia, N., & Santoso, S. (2020). Effects of subjective norms, perceived behavioral control, perceived risk, and perceived usefulness towards intention to use credit cards in Surabaya, Indonesia. *SHS Web of Conferences*. EDP Sciences.
- Anastasiadis, T., Lampropoulos, G., & Siakas, K. (2018). Digital game-based learning and serious games in education. *International Journal of Advances in Scientific Research and Engineering*, 4(12), 139-144. <https://doi.org/10.31695/IJASRE.2018.33016>
- Asebedo, S., & Payne, P. (2019). Market volatility and financial satisfaction: The role of financial self-efficacy. *Journal of Behavioral Finance*, 20(1), 42-52. <https://doi.org/10.1080/15427560.2018.1434655>
- Bisanti, M., Di Paolo, R., Pizziol, V., Accardi, S., Maggi, F., Paladino, G., ... & Bilancini, E. (2022). Digital escape games in educational programs for financial literacy. In *European Conference on Games Based Learning* (Vol. 16, No. 1, pp. 666-674). <https://doi.org/10.34190/ecgbl.16.1.857>
- Fox, J., Pittaway, L., & Uzuegbunam, I. (2018). Simulations in entrepreneurship education: Serious games and learning through play.

- Entrepreneurship Education and Pedagogy, 1(1), 61–89. <https://doi.org/10.1177/2515127417737285>
- Grivokostopoulou, F., Kovas, K., & Perikos, I. (2019). Examining the impact of a gamified entrepreneurship education framework in higher education. *Sustainability*, 11(20), 5623. <https://doi.org/10.3390/su11205623>
- Hayder, J. O., & Mohanad, H. Y. (2023). The role of financial literacy in achieving financial satisfaction through financial well-being. *International Journal of Professional Business Review*, 8(7). <https://doi.org/10.26668/businessreview/2023.v8i7.1607>
- Hidayat, R. (2018). Game-based learning: Academic games as a method to support entrepreneurship learning (Game-based learning: Academic games sebagai metode penunjang pembelajaran kewirausahaan). *Buletin Psikologi*, 26(2), 71–85. <https://doi.org/10.22146/buletinpsikologi.30988>
- Jääskä, E., Lehtinen, J., Kujala, J., & Kauppila, O. (2022). Game-based learning and students' motivation in project management education. *Project Leadership and Society*, 3, 100055. <https://doi.org/10.1016/j.plas.2022.100055>
- Krajger, I., Lattacher, W., & Schwarz, E. J. (2020). Creating and testing a game-based entrepreneurship education approach. In *The Challenges of the Digital Transformation in Education: Proceedings of the 21st International Conference on Interactive Collaborative Learning (ICL2018)* (Vol. 1, pp. 697–709). Springer International Publishing. https://doi.org/10.1007/978-3-030-11932-4_65
- Leiming, H. (2023). Research on financial autonomy and financial management in public higher education. *International Journal of Business, Economics & Management*. <https://doi.org/10.21744/ijbem.v6n2.2126>
- Mutamimah, M., Tholib, M., & Robiyanto, R. (2021). Corporate governance, credit risk, and financial literacy for small medium enterprise in Indonesia. *Business: Theory and Practice*, 22(2), 406–413. <https://doi.org/10.3846/btp.2021.13194>
- Paeßens, J., & Winther, E. (2021). Game design in financial literacy: Exploring design patterns for a collaborative and inclusive serious game from different perspectives. In *Game-Based Learning Across the Disciplines* (pp. 43–59). Springer International Publishing. https://doi.org/10.1007/978-3-030-75142-5_3
- Perez-Macías, N., Medina-Molina, C., & Gismera-Tierno, L. (2022). Gamification in the development of entrepreneurial intentions: A QCA analysis. *Entrepreneurship Education*, 5(3), 343–365. <https://doi.org/10.1007/s41959-022-00079-7>
- Putra, P. O. H., & Santoso, H. B. (2020). Contextual factors and performance impact of e-business use in Indonesian small and medium enterprises (SMEs). *Heliyon*, 6(3). <https://doi.org/10.1016/j.heliyon.2020.e03568>
- Rasco, A., Chan, J., Peko, G., & Sundaram, D. (2020). Fincraft: Immersive personalised persuasive serious games for financial literacy among young decision-makers. In *Proceedings of the 53rd Hawaii International Conference on System Sciences* (pp. 32–41).
- Rasco, A., Chan, J., Peko, G., & Sundaram, D. (2021). Evolution of serious games to support lifelong learning and decision making: Design and implementation of a financial literacy game. In *Proceedings of the 54th Hawaii International Conference on System Sciences*. HICSS Conference Office.
- Ratnawati, K., Azzahra, N., & Dewanta, P. P. (2023). The influence of financial literacy and financial attitude on financial management behavior: A

- study on culinary micro SMEs in Rawamangun Urban Village, East Jakarta City. *International Journal of Research in Business and Social Science*, 12(1), 165–173. <https://doi.org/10.20525/ijrbs.v12i1.2301>
- Sedyastuti, K., Suwarni, E., Rahadi, D. R., & Handayani, M. A. (2021). Human resources competency at micro, small and medium enterprises in Palembang Songket industry. In *2nd Annual Conference on Social Science and Humanities (ANCOSH 2020)* (pp. 248–251). Atlantis Press. <https://doi.org/10.2991/assehr.k.210413.057>
- Tambunan, T. (2019). Recent evidence of the development of micro, small and medium enterprises in Indonesia. *Journal of Global Entrepreneurship Research*, 9(1), 18. <https://doi.org/10.1186/s40497-019-0156-4>
- Wardi, J., & Putri, G. E. (2020). The importance of implementing financial management for MSMEs. *Scientific Journal of Economics and Business* (Pentingnya penerapan pengelolaan keuangan bagi UMKM. *Jurnal Ilmiah Ekonomi Dan Bisnis*).
- Zhu, A. Y. F., Yu, C. W. M., & Chou, K. L. (2021). Improving financial literacy in secondary school students: A randomized experiment. *Youth & Society*, 53(4), 539–562. <https://doi.org/10.1177/0044118X20938440>
- Zhu, A. Y. F., Yu, C. W. M., & Chou, K. L. (2021). Improving financial literacy in secondary school students: A randomized experiment. *Youth & Society*, 53(4), 539–562. <https://doi.org/10.1177/0044118X20938440>
- Zulfiqar, S., Sarwar, B., Aziz, S., Chandia, K. E., & Khan, M. K. (2019). An analysis of influence of business simulation games on business school students' attitude and intention toward entrepreneurial activities. *Journal of Educational Computing Research*, 57(1), 106–130. <https://doi.org/10.1177/0735633117746746>.