Impact of Mobile Computing and Gamification toward Teenagers Characteristic Development and Personality

Hasan Saleh[1*], Nur Afiqah Khumairah[2]

[1 2] Fakulti Pengurusan Teknologi dan Teknousahawanan, Universiti Teknikal Malaysia Melaka

[*]Corresponding Author

DOI: https://dx.doi.org/10.47772/IJRISS.2025.92800008

Received: 01 November 2025; Accepted: 07 November 2025; Published: 18 December 2025

ABSTRACT

This study explores the impact of mobile computing and gamification on teenagers' characteristic development and personality, aiming to understand how the use of mobile devices and gamified experiences influences various aspects of teenagers' development, including their cognitive, emotional, social, and academic domains. Influence of these technologies on personality traits such as creativity, curiosity, and risk-taking behavior, as well as their impact on critical thinking skills, problem-solving abilities, information processing, examining teenagers' social behavior, online interactions, and digital citizenship. Potential risks and challenges, including cyberbullying, privacy concerns, and excessive screen time, are addressed alongside the role of parental guidance and family dynamics in shaping teenagers' technology use. Ethical implications, such as privacy, data security, and equity, are discussed. Using survey data from 90 respondents, findings reveal, Teenager Behaviour ($r = .255$, $p < .05$) and Influences in Learning Outcome & Academic Performance ($r = .344$, $p < .01$) have significant positive relationships with Teenager Personality, Whereas Factor Influences Teenager Behaviour ($r = .020$, $p > .05$) shows no significant relationship. Regression analysis further confirms learning outcomes and behavioural impacts are key predictors of teenager personality development in the context of mobile computing and gamification. Results suggest not all factors contribute equally, positive effects of technology use and improved academic outcomes play a meaningful role in shaping teenagers' personality traits, and providing insights for promoting healthy and beneficial technology use among teenagers

Keywords: Mobile computing; Gamification; Teenagers; Characteristic development; Personality.

INTRODUCTION

Today, number of gamers and internet users are seeing rise in demand and addiction over time (Masaeli and Farhadi, 2021). The contemporary period is the age of technology, thus youngsters are increasingly playing games online. Digital gaming is becoming more popular all over the world (Sanjaya and Jose, 2023). The unfavorable effect creates a number of side effects harm teenagers and their ties to their families. Teenagers now play digital and online games instead of traditional playground and street activities, and their enthusiasm for digital gaming addiction which is developing and being utilized excessively and impulsively (Danish, 2023).

Gamification comes from the computer gaming industry and uses game elements in non-game situations to keep people engaged, solve challenges, and guide behavior (Prasad, 2021). Gamification mainly works by appealing to natural human needs such as competition, achievement, recognition, and self-expression (Zhao, 2024). Gamification is quickly making the transition from gaming to the office (Sharma, 2023).

Analyzing educational practices and the courses offered by institutions provides valuable insight into how gamification integrates game design, game thinking, and game mechanics to enhance non-game contexts (Luo, 2022). Gamification mainly works by using game mechanics to improve situations, which can help boost adolescents' cognitive development (Antonopoulou et al. 2022).

Excessive use of mobile phones among teenagers has become a growing concern in todays digital age (Nakshine et al, 2022). Easy access to mobile computing devices, teenagers are increasingly spending excessive amounts of time engaged with their phones, which can have detrimental effects on their well-being and development (Gierella-Serrano et al. 2024).

Teenagers lack of self-regulation in mobile computing and gamification poses serious risks to their well-being and development (Sala et al. 2024). As smartphones and gamified apps become more common, they are often drawn to engage in these activities excessively and impulsively.

This study try to explore the relationship between mobile computing, gamification, and teenagers' social behavior, including their online interactions, social media usage, and digital citizenship.

Problem Statement

Growing influence of mobile computing and gamification have a significant impact on how teenagers develop their personalities and navigate their daily lives (Li et al. 2022). Widespread access to smartphones and tablets, teens are constantly engaged with digital tools for entertainment, education, and communication (Ricoy and Martinez, 2021). These technologies offer many benefits, and also raise concerns about their effects on mental health, academic performance, and social relationships.

Gamification, which uses game-like features in non-game settings, is becoming more common in areas like education, healthcare, and social media and increase motivation and engagement, but it may also encourage traits such as competitiveness, risk-taking, and self-promotion (Wulan et al. 2024).

Excessive use of mobile devices can lead to anxiety, low self-esteem, and addiction (Edwards et al. 2022). Many teenagers struggle with self-regulation, finding it difficult to manage their screen time and balance digital activities with other responsibilities (George et al. 2023). Lack of control can affect their physical health, emotional well-being, and ability to concentrate in school (Kliziene et al. 2021). Constant distractions from mobile apps and games make it harder for teens to stay focused and perform well academically (Joshi et al. 2023). Understanding these challenges is essential to helping teenagers build healthier technology habits and supporting their overall development in a digital world.

External factors such as peer pressure, family dynamics, and school environments significantly influence teenagers digital behavior (Li et al. 2025). Peer groups often set social norms regarding technology use, encouraging participation in online gaming or social media, while family relationships and parental guidance determine how responsibly these technologies are used (Huda et al. 2017). Without sufficient support systems, teenagers may adopt unhealthy usage patterns affect both their learning and personal growth.

Psychological impact of gamification, can shape intrinsic motivation and decision-making (Zourmpakis et al. 2023). While gamified platforms enhance engagement through rewards and recognition, may also lead to dependency on external validation rather than fostering genuine self-discipline and resilience (Ramzan et al. 2025). This reliance may limit the development of autonomy and balanced personality traits, creating long-term challenges for teenagers as they transition into adulthood.

Integration of mobile computing and gamification in education presents both opportunities and risks. On one hand, these tools can improve learning outcomes, active participation, and critical thinking. On the other hand, limited access to technology in schools, lack of digital literacy, and uneven implementation of gamified learning strategies may widen the gap in educational equity. These disparities highlight the urgent need to investigate how mobile computing and gamification influence teenager personality development, academic performance, and overall well-being, in order to develop balanced strategies maximize benefits while minimizing risks.

Research Question

This study aims to investigate the behavioral patterns of teenagers in relation to mobile computing and gamification by addressing three (3) key research questions.

1. What are the factors influence teenager behavior in using mobile computing and gamification?

2. How mobile computing and gamification can impact teenager behavior?
3. How mobile computing and gamification can influence teenager in learning outcome and academic performance?

Research Objective

The objectives of this study as per below:

1. To determine the factors influence teenager behavior in using mobile computing and gamification.
2. To identify the impact of mobile computing and gamification on teenager behavior.
3. To examine how mobile computing and gamification influence teenagers' learning outcomes and academic performance.

LITERATURE REVIEW

This study contributes to the achievement of the research objectives from literature review aims to provide information that have been recognized on the topic of the impact of mobile computing and gamification toward teenagers characteristic development and personality.

The factor influence teenager behavior

Teenagers' behavior is shaped by their environment, which includes family, peers, school, community, media, technology, and cultural norms (Vickery, 2012). Factors such as parenting styles, peer influence, teacher-student relationships, socioeconomic status, and societal values directly affect their health, motivation, and attitudes (Sumanasekera et al. 2021). Understanding these helps in designing strategies for positive outcomes in mobile computing and gamification.

Several psychological aspects which it boosts intrinsic motivation with rewards and progress tracking, increases cognitive and emotional engagement through storytelling and interactive experiences, and supports self-determination needs (relatedness, competence, autonomy) (Lamprinou and Paraskeva, 2015). These elements together shape teenagers' motivation, attitudes, and behavior in gamified activities.

Another factor involves teenagers' is ways of thinking, which are strongly shaped by their experiences with digital technologies. Mobile computing and gamification encourage goal-oriented behavior, problem-solving, and critical thinking, as teenagers engage in decision-making and creative problem resolution within gamified contexts (Ferraz et al. 2024). Social influence also plays a role, as teenagers compare achievements with peers, affecting self-perception and reinforcing digital habits. These processes highlight how cognitive styles and social pressures converge to shape adolescents' technology use and personality development.

Physical health also a major consideration, as technology use and gamified platforms can both promote and hinder well-being. On the positive side, fitness apps and wearable devices use gamification to encourage healthy behaviors, exercise, and lifestyle improvements (Spil et al. 2017). Prolonged screen time and sedentary digital engagement may reduce physical activity, leading to risks such as obesity, fatigue, or reduced stamina (Nakshine et al. 2022). Balancing digital engagement with physical activities is therefore essential to ensuring mobile computing and gamification contribute positively to both mental and physical development (Ali et al. 2024).

Impact of teenager behaviour

Teenagers' use mobile computing can affect system performance both positively and negatively. Immature apps may cause disruptions, while technologies like mobile edge computing, computation offloading, and cloudlets can improve efficiency, reduce latency, and enhance user satisfaction (Jiang et al. 2021). Performance improvements can boost teenagers' motivation, self-confidence, and engagement in gamified learning, and influencing their social interactions through recognition and peer acceptance (Zainuddin, 2018).

Excessive focus on performance may lead to over-competitiveness, stress, neglect of other life aspects, and fixed

mindsets. A balanced approach values both performance and holistic development is crucial for physical well-being (Saleh and Shahidan, 2023).

Effective learning experiences supported by mobile computing and gamification can promote critical thinking, problem-solving, and self-efficacy. By integrating interactive activities, instant feedback, and collaborative features, these technologies encourage deeper engagement and persistence in academic tasks (Sabri et al. 2024). Such positive learning environments not only enhance educational outcomes but also shape personality traits like resilience, adaptability, and intrinsic motivation.

Student engagement and active participation are central to the success of gamified and mobile-based learning. Teenagers who experience autonomy, collaboration, and recognition in digital learning contexts tend to show greater curiosity, responsibility, and willingness to take on challenges (Liu et al. 2025). Disparities in access to technology, especially in rural or under-resourced schools, may limit these benefits and contribute to unequal personality development and academic achievement.

Learning outcome and academic performance

Learning outcomes represent the knowledge, skills, and attitudes students are expected to acquire, while academic performance reflects their overall achievement through grades, test scores, and evaluations (Lampropoulos, 2024). Both are key indicators of educational success and future opportunities.

Mobile computing and gamification can enhance these outcomes by increasing engagement, motivation, and active participation, offering access to educational resources, personalized learning, and interactive experiences (Pechenkina, et al. 2017). When effectively applied, they create a dynamic and enjoyable learning environment fosters curiosity, intrinsic motivation, and self-directed learning (Slamet et al. 2024).

Gamification introduces game-based elements such as challenges, leaderboards, and rewards encourage continuous effort and persistence. By providing immediate feedback and visible progress tracking, gamified learning environments allow students to recognize their strengths and address weaknesses in real time. This process strengthens self-efficacy, builds confidence, and cultivates a growth mindset, all of which positively influence personality development and long-term academic achievement.

Collaborative and social dimensions of mobile computing and gamified platforms promote teamwork, peer interaction, and shared learning experiences (Slamet, 2024). Engaging in cooperative challenges and online communities, students develop communication, empathy, and problem-solving skills (Wang, 2022). These experiences not only enhance academic performance but also contribute to social maturity and personal growth. Disparities in access to technology and uneven digital literacy may limit these benefits, underlining the importance of inclusive strategies to ensure equitable learning opportunities for all teenagers

METHOD

This study employed a quantitative research approach using a structured questionnaire to investigate teenagers' behavior in relation to mobile computing and gamification. A random sampling technique was used to select 90 students from XYZ secondary school in Melaka, ensuring a diverse representation of adolescent experiences.

Data collection was conducted over a one-month period, and the responses were analyzed using the Statistical Package for the Social Sciences (SPSS), version 29.

RESULTS AND DISCUSSION

Demographic respondents

Total of 90 respondents were involved in the data collection process for this research study. According to Table 1, more male respondents were involved than male respondents, namely 49 respondents (54.4%). The age of the respondents with the highest frequency is the ages of 16 years old, a total of 50 respondents (55.6%). Most of the respondents involved are Malay, which is 66 respondents (71.7%). The majority of 90 respondents (100%) are from Melaka. Meanwhile, 80 respondents are mostly using smartphone, which is 88.9%.

Table 1: Descriptive Analysis of Respondent's

Demographic	Frequency with highest value	Frequency	Percent (%)
Gender	Male	49	54.4%
Age	16 years	50	55.6%
Race	Malay	66	74.2%
State	Melaka	90	100%
What of mobile devices do you use most frequently?	Smartphone	80	88.9%

Pearson Correlation

Pearson correlation analysis demonstrated a weak positive relationship between the impact on teenager behavior and the influences teenager in learning outcome and academic performance rate r (21) = .215. Moreover, there are moderate positive relationship between factor influence teenager behavior and the impact on teenager behavior rate r (42) = .425.

Factor Influences Teenager Behaviour, result showed a correlation of r = .020 with p = .852, which indicates no significant relationship with Teenager Personality. This finding suggests environmental, psychological, or physical health factors influencing behaviour do not directly translate into personality development when combined with mobile computing and gamification. Therefore, this factor is not proven to be meaningful in shaping teenager personality within the scope of this study.

Impact on Teenager Behaviour, recorded a correlation of r = .255 with p = .015. Although the strength is categorized as weak, it is statistically significant. This result demonstrates the impact of mobile computing and gamification, such as improvements in performance and effective learning, has a positive association with teenager personality. In practice, this means teenagers who report stronger impacts from technology use are more likely to show positive development in traits such as motivation, engagement, or creativity.

Influences in Learning Outcome and Academic Performance, showed the strongest correlation with Teenager Personality at r = .344, p = .001. This positive and significant result indicates when teenagers experience better academic outcomes and learning effectiveness through mobile computing and gamification, directly supports their personality growth. In other words, improved learning achievements contribute to shaping confidence, self-efficacy, and positive attitudes in teenagers. In addition to the above, the inter-variable correlations also support the overall findings. Factor and Impact were strongly correlated (r = .425, p < .01), while Factor and Influences (r = .273, p = .009) and Impact and Influences (r = .215, p = .041) showed weaker but significant associations. These results suggest although Factor does not directly relate to Personality, it is indirectly connected through its relationship with the other independent variables.

Table 2: Correlation Result

Correlations					
		Factor	Impact	Influences	Personality
Factor	Pearson Correlation	1	.425**	.273**	.020
	Sig. (2-tailed)		.000	.009	.852
	N	90	90	90	90

Impact	Pearson Correlation	.425**	1	.215*	.255*
	Sig. (2-tailed)	.000		.041	.015
	N	90	90	90	90
Influences	Pearson Correlation	.273**	.215*	1	.344**
	Sig. (2-tailed)	.009	.041		.001
	N	90	90	90	90
Personality	Pearson Correlation	.020	.255*	.344**	1
	Sig. (2-tailed)	.852	.015	.001	
	N	90	90	90	90

Multiple Linear Regression Analysis

R Square value of 0.178, the set of factors (Influences, Impact, and Factor) can explain 17.8% of the variation in the dependent variable (Personality). However, the Adjusted R Square, which considers the number of predictors, slightly reduces this explanatory power to 15%.

There is a moderately good relationship between the variables and the dependent variable, as shown by the R value of 0.422a. The 'a' indicates a potential partial correlation, and its interpretation relies on the specific details of the analysis. The standard error of the guess, which is 0.52833, shows how much the real 'Personality' scores are different from the expected scores on average. When the number is low, it means the model and the facts are more closely related.

Table 3: Model Summary

Model Summary[b]			
Model	R	R Square	Adjusted R Square
1	.422[a]	.178	.150
a. Predictors: (Constant), Influences, Impact, Factor			
b. Dependent Variable: Personality			

ANOVA Analysis

The F test value is 6.227, and the significant level is 0.001. The significance level is lower than 0.05, which means there is significance in the relationship between teenager personality in factor influence teenager behavior, impact on teenager behavior and the influences of teenager in learning outcome and academic performance in using mobile computing and gamification.

Table 4: ANOVA Analysis

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.215	3	1.738	6.227	.001[b]

	Residual	24.005	86	.279		
	Total	29.220	89			

a. Dependent Variable: Personality

b. Predictors: (Constant), Influences, Impact, Factor

Hypothesis Result

The hypothesis result of this study as per below:

1. Factor influence teenager behavior in using mobile computing & gamification and teenager personality (Not supported, t < 1.645) The factor influence teenager behavior shows the findings do not support the hypothesis as there is no significant relationship between the factor influence teenager behavior in using mobile computing and gamification and the teenager personality. The rejection of Hypothesis 1 is likely due to the weak effect size (small beta value), the observed relationship not meeting the significance and the questionnaire responses indicating influences, while present, may not strongly impact teenager personality. The desire for entertainment drives respondents to use mobile applications and gamification. This aligns with the negative beta, indicating increased influence from entertainment-driven factors may lead to a decrease in certain aspects of teenager personality.
2. Impact on teenager behavior in using mobile computing and gamification and teenager personality (Supported, t > 1.645) The acceptance of Hypothesis 2 is justified by the positive beta, significant t value, and the questionnaire responses indicating positive impacts on various aspects of teenager personality. The findings suggest the use of mobile computing and gamification has a meaningful and statistically significant relationship with teenager personality. The use of gamification elements affecting self-motivation in completing tasks and activities is indicated by respondents. This aligns with the positive beta, reflecting a positive relationship between these impacts and teenager personality.
3. The influences of teenager in learning outcome and academic performance and teenager personality. (Supported, t > 1.645)The acceptance of Hypothesis 3 is justified by the positive beta, significant t value, and the questionnaire responses indicating positive impacts on various aspects of teenager personality related to learning outcomes and academic performance. The findings suggest the influences of teenagers in learning outcomes and academic performance have a meaningful and statistically significant relationship with teenager personality. Respondents feel the effect of educational gamification applications can help them understand academic subjects. This aligns with the positive beta, reflecting a positive relationship with aspects of teenager personality related to academic understanding. Furthermore, respondents believe gamified educational applications can help them in effective preparation for exams. This aligns with the positive beta, suggesting a positive relationship with aspects of teenager personality related to academic preparation.

Table 5: Hypothesis result

Hypothesis	Description	Result
H1	There is a significant relationship between the factor influence teenager behavior in using mobile computing and gamification with teenager personality.	Rejected
H2	There is a significant relationship between impact on teenager behavior in using mobile computing and gamification with teenager personality.	Accepted
H3	There is a significant relationship between the influences of teenager in learning outcome and academic performance with teenager personality.	Accepted

Answer for Research Question

The answer question of this research as per below :-

What are the factors influence teenager behavior in using mobile computing and gamification?

The analysis showed no significant relationship between the identified factors and teenager personality. The factor impact teenaged behaviour had a negative beta value of -0.185, a t value of -1.654 (t > 1.645), and a significance value of 0.102 (p0.05). This indicates external influences such as environment, peers, and family do not strongly determine how mobile computing and gamification shape teenagers' personality development.

How mobile computing and gamification can impact teenager behavior?

The impact of mobile computing and gamification on teenager behavior, was supported. The beta value of the impact on teenager behavior is showed positive with 0.259. The t value is more than 1.645, which scored a positive t value 2.386, and the significance value 0.019 is less than 0.05. The results demonstrated a significant positive relationship, suggesting the use of mobile computing and gamification contributes positively to shaping teenagers' behavior, particularly in aspects such as motivation, self-discipline, and digital engagement.

How mobile computing and gamification can influence teenager in learning outcome and academic performance?

Mobile computing and gamification influence learning outcomes and academic performance, was also supported. The beta value of the influences teenager on learning outcomes and academic performance was 0.338, the t value was 3.303 (t > 1.645), and the significance value was 0.001 (p0.05). The analysis confirmed a significant positive effect, highlighting these technologies enhance teenagers' learning experiences and academic performance by promoting better understanding of subjects, improving preparation for examinations, and encouraging active learning.

CONCLUSION

This study found mobile computing and gamification positively influence teenagers' motivation, engagement, and learning effectiveness, even though environmental, psychological, and physical factors showed little impact on personality. Gamification elements like rewards and challenges kept students interested, while mobile computing provided flexibility in learning. Despite risks such as overuse and distraction, the study concludes these technologies support personal growth, social interaction, and academic performance provided they are applied with balance and proper guidance.

RECOMMENDATION AND FUTURE STUDY

Future research on mobile computing and gamification should include diverse schools and demographics to improve generalizability, with comparisons between urban and rural settings to highlight differences in access, digital literacy, and outcomes. A mixed-methods approach encouraged combining quantitative surveys with qualitative interviews to capture both measurable trends and personal experiences. Longitudinal and cross-cultural studies would provide insight into long-term and context-specific effects on adolescent development. Finally, exploring interventions and digital literacy programs could guide educators, parents, and policymakers in promoting balanced and beneficial use of these technologies.

ACKNOWLEDGEMENT

Special gratitude is extended to all personnel and individuals who contributed to this research. The author also would like to thank Universiti Teknikal Malaysia Melaka (UTeM) for all the support.

REFERENCES

1. Ali, R. F., Ali, S. R., & Butt, A. R. (2024). Impact Of Gamification On Children's Physical And Mental Health: Benefits And Risks. International Research Journal of Social Sciences and Humanities, 3(3), 102-122.

2. Antonopoulou, H., Halkiopoulos, C., Gkintoni, E., & Katsibelis, A. (2022). Application of gamification tools for identification of neurocognitive and social function in distance learning education. International Journal of Learning, Teaching and Educational Research, 21(5), 367-400.
3. Danish, M. Gaming Addiction Is A Growing Issue Among Childrens: A Systematic Literature Review. Principal's Massage, 19.
4. Edwards, E. J., Taylor, C. S., & Vaughan, R. S. (2022). Individual differences in self-esteem and social anxiety predict problem smartphone use in adolescents. School Psychology International, 43(5), 460-476.
5. Ferraz, R., Ribeiro, D., Alves, A. R., Teixeira, J. E., Forte, P., & Branquinho, L. (2024). Using Gamification in Teaching Physical Education: A survey review. Montenegrin Journal of Sports Science & Medicine, 13(1).
6. George, A. S., George, A. H., Baskar, T., & Shahul, A. (2023). Screens steal time: How excessive screen use impacts the lives of young people. Partners Universal Innovative Research Publication, 1(2), 157-177.
7. Girela-Serrano, B. M., Spiers, A. D., Ruotong, L., Gangadia, S., Toledano, M. B., & Di Simplicio, M. (2024). Impact of mobile phones and wireless devices use on children and adolescents' mental health: a systematic review. European child & adolescent psychiatry, 33(6), 1621-1651.
8. Huda, M., Jasmi, K. A., Hehsan, A., Mustari, M. I., Shahrill, M., Basiron, B., & Gassama, S. K. (2017). Empowering children with adaptive technology skills: Careful engagement in the digital ınformation age. International electronic Journal of elementary education, 9(3), 693-708.
9. Jiang, K., Zhou, H., Chen, X., & Zhang, H. (2021). Mobile edge computing for ultra-reliable and low-latency communications. IEEE Communications Standards Magazine, 5(2), 68-75.
10. Joshi, S. C., Woodward, J., & Woltering, S. (2023). Cell phone use distracts young adults from academic work with limited benefit to self-regulatory behavior. Current Psychology, 42(31), 27071-27087.
11. Kliziene, I., Cizauskas, G., Sipaviciene, S., Aleksandraviciene, R., & Zaicenkoviene, K. (2021). Effects of a physical education program on physical activity and emotional well-being among primary school children. International journal of environmental research and public health, 18(14), 7536.
12. Lamprinou, D., & Paraskeva, F. (2015, November). Gamification design framework based on SDT for student motivation. In 2015 International Conference on Interactive Mobile Communication Technologies and Learning (IMCL) (pp. 406-410). IEEE.
13. Lampropoulos, G., & Sidiropoulos, A. (2024). Impact of gamification on students' learning outcomes and academic performance: A longitudinal study comparing online, traditional, and gamified learning. Education Sciences, 14(4), 367.
14. Li, Y., Xu, Z., Hao, Y., Xiao, P., & Liu, J. (2022, April). Psychosocial impacts of mobile game on K12 students and trend exploration for future educational mobile games. In Frontiers in Education (Vol. 7, p. 843090). Frontiers Media SA.
15. Li, Z., Xie, S., & Chen, W. (2025). The influence of environment on adolescents' physical exercise behavior based on family community and school micro-systems. Scientific Reports, 15(1), 12024.
16. Liu, Jiawen, Rustam Shadiev, and Mei Cao. (2025) "Effects of digital citizenship educational game on teenagers' learning achievement, motivation, cognitive load, and behavioral patterns." Education and Information Technologies (2025): 1-54.
17. Luo, Z. (2022). Gamification for educational purposes: What are the factors contributing to varied effectiveness?. Education and Information Technologies, 27(1), 891-915.
18. Masaeli, N., & Farhadi, H. (2021). Prevalence of Internet-based addictive behaviors during COVID-19 pandemic: A systematic review. Journal of addictive diseases, 39(4), 468-488.
19. Nakshine, V. S., Thute, P., Khatib, M. N., & Sarkar, B. (2022). Increased screen time as a cause of declining physical, psychological health, and sleep patterns: a literary review. Cureus, 14(10).
20. Pechenkina, E., Laurence, D., Oates, G., Eldridge, D., & Hunter, D. (2017). Using a gamified mobile app to increase student engagement, retention and academic achievement. International Journal of Educational Technology in Higher Education, 14(1), 31.
21. Prasad, K. (2021). Gamification and its applications. Journal of Business Strategy, Finance and Management, 2(2).
22. Ramzan, M., Zafar, M. J., Naseeb, S., Naveed, Z., Saqib, M., & Qadeer, M. (2025). Study Of Effectiveness Of Gamification And Its Impact On The Education: A Review. Contemporary Journal of Social Science Review, 3(2), 995-1006.
23. Ricoy, M. C., & Martínez-Carrera, S. (2021). Digital newspapers' perspectives about adolescents'

smartphone use. Sustainability, 13(9), 5316.
24. Sabri, S. M., Ismail, I., Annuar, N., Rahman, N. R. A., Abd Hamid, N. Z., & Abd Mutalib, H. (2024). A conceptual analysis of technology integration in classroom instruction towards enhancing student engagement and learning outcomes. Integration, 9(55), 750-769.
25. Sala, A., Porcaro, L., & Gómez, E. (2024). Social media use and adolescents' mental health and well-being: an umbrella review. Computers in Human Behavior Reports, 14, 100404.
26. Saleh, H. (2020). Enhance small medium enterprise (SMES) family business in Malaysia through e-marketing strategies. International Journal of Scientific & Technology Research, 9(2), 33206-33209.
27. Saleh, H., & Rajandran, T. (2024). Relationship between Non-Muslim consumer intention to purchase Halal Products with Halal Awareness, Halal Certification, Halal Marketing and Halal Knowledge: Systematic Review. International Journal of Academic Research in Business and Social Sciences, 14(9), 416-426.
28. Saleh, H., & Shahidan, N. S. (2023). Work Stress and Its Impact on Employee Performance, Turnover, and Absenteeism: A Comprehensive Study at E & E Manufacturing. International Journal of Magistravitae Management, 1(2), 70-80.
29. Saleh, H., & Wahab, N. A. A. (2024). Employers' Perspectives on Skills Falling Short, HEIs' Education System, and Graduates' Attributes: A Proposed Framework. International Journal of Academic Research in Business and Social Sciences, 14(8), 93-107.
30. Saleh, H., & Wahab, N. A. A. (2025). Employers' Perspectives on Malaysian Graduates' Skills: A Contemporary Study. Journal of TVET and Technology Review, 3(1), 16-23.
31. Sanjaya, K., Chandra, R., & Jose, J. (2023). The digital gaming revolution: An analysis of current trends, issues, and future prospects. Russian Law Journal, 11(1), 18-29.
32. Sharma, D., & Sharma, J. (2023). Evolution of gamification, its implications, and its statistical impact on the society. Journal of Visual and Performing Arts, 4, 8-20.
33. Slamet, J., Basthomi, Y., Ivone, F. M., & Eliyanah, E. (2024). Unlocking the potential in a gamification-based MOOC: Assessing autonomous learning and self-directed learning behaviors. Teaching and Learning Inquiry, 12, 1-20.
34. Slamet, T. I. (2024). A Study of Learners' Behavior, Cognition, and Attitudes in Cooperative Learning Using Gamification. Indiana University.
35. Spil, T., Sunyaev, A., Thiebes, S., & Van Baalen, R. (2017). The adoption of wearables for a healthy lifestyle: can gamification help?.
36. Sumanasekera, I., Abd Hamid, J., Khatibi, A., & Azam, S. F. (2021). Involvement and style of parents on student motivation towards student performance with the moderating effect of academic causal factors: development of a conceptual model. Global Journal of Management and Business Research, 21(1), 10-24.
37. Vickery, J. R. (2012). Worth the risk: The role of regulations and norms in shaping teens' digital media practices.
38. Wang, Y. P., & Wu, T. J. (2022). Effects of online cooperative learning on students' problem-solving ability and learning satisfaction. Frontiers in Psychology, 13, 817968.
39. Wulan, D. R., Nainggolan, D. M., Hidayat, Y., Rohman, T., & Fiyul, A. Y. (2024). Exploring the benefits and challenges of gamification in enhancing student learning outcomes. Global International Journal of Innovative Research, 2(7), 1657-1674.
40. Zainuddin, Z. (2018). Students' learning performance and perceived motivation in gamified flipped-class instruction. Computers & education, 126, 75-88.
41. Zhao, F. (2024). Gamification Design. In User Experience Methods and Tools in Human-Computer Interaction (pp. 373-441). CRC Press.
42. Zourmpakis, A. I., Kalogiannakis, M., & Papadakis, S. (2023). Adaptive gamification in science education: An analysis of the impact of implementation and adapted game elements on students' motivation. Computers, 12(7), 143.