Educational Administration: Theory and Practice
2024, 30(10), 71 -76
ISSN: 2148-2403
https://kuey.net/

Research Article

Exploring The Influence Of Gamification-Based Learning On Lower Order Thinking Skills Toward Mathematics Learning In Primary-Level Students: A Qualitative Study

Mujeeb Ur Rahim[1*], Lubna Ali Mohammed[2], Shams Ul Haq[3]

[1*]PhD Scholar in Education, Faculty of Social Sciences, Arts and Humanities, Lincoln University Malaysia
Email: mrahim@lincoln.edu.my
[2]Associate Professor, Department of TESL, Faculty of Social Sciences, Arts and Humanities, Lincoln University College Malaysia.
Email: lubnaali@lincoln.edu.my
[3]Lecturer, Department of Educational Development, Karakorum International University Ghizar Campus, Gilgit Baltistan.
Email: Shamsulhaq@kiu.edu.pk

***Corresponding Author:** Mujeeb ur Rahim
[1*]Ph.D. Scholar in Education, Faculty of Social Sciences, Arts and Humanities, Lincoln University College Malaysia,
Email: mrahim@lincoln.edu.my, Telephone number: +923377105783/ +923555203993

Citation: Mujeeb Ur Rahim, et.al (2024), Exploring The Influence Of Gamification-Based Learning On Lower Order Thinking Skills Toward Mathematics Learning In Primary-Level Students: A Qualitative Study, *Educational Administration: Theory and Practice, 30(10), 71 -76*
Doi: 10.53555/kuey.v30i10.7900

ARTICLE INFO

ABSTRACT

Gamification, which involves incorporating game aspects into non-game contexts, creates interest in education due to its potential to improve student engagement and learning outcomes. This research study explores the role of gamification-based learning, especially via Kahoot games, on fifth-grade students' lower-order thinking skills. The study used a qualitative research design and gathered data via interviews with eight fifth-grade students. Interview questions are translated into Urdu and validated by the experts and scholars. The researchers used purposive sampling to choose the individuals. The data obtained from students was analyzed using thematic analysis. The results described that all participants agreed that Kahoot games are very helpful in supporting mathematics learning, and they also emphasized that Kahoot-based games provide immediate feedback and high levels of engagement of students. Furthermore, participants responded positively to gamified learning experiences, considering them fun and engaging. In addition, students perceived that Kahoot greatly improved their lower-level thinking skills. Future studies might comprehensively investigate the impact of Kahoot-based gamification on improving higher-level cognitive skills in mathematics.

Keywords: Gamification, Learning, Kahoot, Lower Order Thinking Skills

1 Background of the Study

The incorporation of game elements into non-game environments, known as gamification, is now widely acknowledged as a beneficial method for enhancing student engagement, motivation, and learning outcomes in current educational settings (Ratinho & Martins, 2023; Aparicio et al., 2019). When used with game-based learning methods, gamification impacts technology progress to encourage certain behaviors and enhance educational achievements (Zainuddin et al., 2020). Within academic debates, gamification refers to applying game aspects in non-gaming situations to enhance user experience and encourage participant participation (Aparicio et al., 2019).

Kahoot is a widely utilized educational platform in schools and universities. It was developed as part of the Lecture Quiz research project at the Norwegian University of Science and Technology in 2006. Kahoot conducted several revisions and investigations over several years to enhance its usability and user-friendliness. The company was established in 2012 with the aim of improving a new game-based learning platform, which later evolved into Kahoot. Kahoot was officially released in September 2013. Kahoot provides a range of interactive elements, such as quizzes and games like multiple-choice questions and jumbles. Users may easily register and access material using a web browser. It is a valuable tool for evaluating students' understanding and monitoring their progress via formative assessments. Kahoot also has questions and is

specifically designed to provide engaging learning opportunities. Participants may active participate by using a shared screen, such as an interactive whiteboard, projector, computer monitor, or smart TV. Gamification platforms such as Kahoot are increasingly favored in educational settings due to their ability to foster student motivation, engagement, and interest, consequently enhancing learning outcomes (Li et al., 2023). Utilizing Kahoot for language acquisition has been shown to alleviate stress and enhance learning efficacy among students (Ahmed et al., 2022).

Implementing the Kahoot game had a beneficial effect on the dynamics of the classroom, as well as on student involvement, motivation, and learning achievements. Prior research asserted that students reported satisfaction with engaging in the Kahoot game and regarded their experiences as pleasant. Furthermore, the teacher can gather student responses and data fastly (Al Ghawail & Yahia, 2022). Kahoot is a famous game-based tool used in classroom settings in educational technology. This application employs a gamification-centered strategy to enhance student engagement by transforming traditional classroom dynamics into interactive quiz-like experiences (Boden & Hart, 2018). Teachers use Kahoot to engage students and foster their excitement for learning English, enhancing their understanding of complex and uninteresting material (Pahamzah et al., 2022).

The use of Kahoot-based gamification in mathematics education is gaining recognition for its ability to influence students' fundamental cognitive abilities. Integrating online gaming platforms into mathematics training has several benefits, particularly by facilitating the learning of new mathematics concepts. Several online Game-Based Learning (GBL) apps effectively teach students, especially younger generations, about geometric concepts related to 2D and 3D forms (Hidayat et al., 2024). According to Balaskas et al. (2023), students express an intense sense of pleasure with the Kahoot platform, which also has a positive impact on improving learning outcomes.

Despite emphasizing mathematics instruction in primary schools, children consistently exhibit low performance on internal and external assessments (Maruta et al., 2022). The issue derives from several factors, such as insufficient fundamental knowledge, the pressure caused by conventional assessment methods, large class numbers, and students' lack of interest and self-control (Nzeadibe et al., 2019). Many students often need help retaining information and maintaining their interest in mathematics, contributing to the issue (Nzeadibe et al., 2020). Although there is an increasing amount of study on the advantages of using gamification in education, especially in improving student engagement and motivation, there still needs to be more details on the specific role of gamification-based learning on lower cognitive skills in primary school students. Although existing literature emphasizes the advantages of gamification in promoting involvement and drive, a further study aims to fill this gap by exploring the role of gamification based learning on lower order thinking abilities of students in fifth-grade.

2 Method

The study used a qualitative research design. Eight students of fifth-grade were interviewed to collect data. Qualitative research data was organized through coding because it helps to ensure enough trustworthy information (Auer-Srnka & Koeszegi, 2007). The interview data was analyzed using thematic analysis, emphasizing detecting patterns and themes connected to the usefulness of Kahoot games in boosting lower-order thinking skills among the students. Interviews allow flexibility to ask questions while maintaining uniformity across participants. Participants were chosen via purposive sampling to ensure a wide range of students' experiences that were well familiar with using the Kahoot game.

2.1 Population and Sampling of the Study

The study focused on a group of 27 fifth-grade students studying at Boys High School Gorikote Astore. The research sought to investigate the influence of gamification-based learning, especially via the use of Kahoot games, on the lower-level cognitive skills of students in the field of mathematics. The sample included 8 students who were chosen via purposive sampling to ensure a wide variety of experiences using Kahoot games.

2.2 Instruments and Data Collection Procedure

This study used interviews as the primary means of data collection, focusing on a sample of 8 fifth-grade students. The interview questions were carefully developed as per the research aims, emphasizing exploring the role of gamification-based learning, especially via Kahoot games, on cognitive skills related to lower-order thinking in mathematics students. Participants were chosen based on their knowledge and prior involvement with Kahoot-based gamification methods. The purposive sampling method was used to identify participants who might provide in-depth insights related to the study aims while efficiently using existing resources (Patton, 2002). The participants chosen for this study were fifth-grade kids who had previous knowledge and experience with Kahoot games. Therefore, it can be particularly beneficial in providing insights into how gamification might improve lower-level thinking skills. Five experts in the field of education performed a rigorous validation to confirm the content validity of the interview questions. The experts evaluated whether the interview questions adequately included all relevant features of the studied phenomena and aligned with the research aims. The research questions are translated into Urdu to ensure a good understanding of

students. The interview was also conducted in Urdu for easy understanding and effective communication with students. Students easily respond to the questions during the interview. The interview questions were improved based on feedback provided by these experts to increase their validity and provide valuable insights about the effects of Kahoot-based gamification on the lower-level cognitive skills of fifth-grade children in mathematics. The interview items are included below:

- Can you tell me about the games we've played in class to help us learn mathematics?
- What do you think about playing Kahoot games to learn mathematics?
- Have you noticed any changes in how you solve learning problems since we started using Kahoot games for learning mathematics?
- Do you prefer playing Kahoot games for learning mathematics over traditional classwork? Why or why not?
- Do you believe that Kahoot games significantly benefit in enhancing lower-order thinking abilities?

2.3 Data Analysis Method

The data collected from the interviews was analyzed using thematic analysis, a technique for discovering patterns, themes, and meanings within qualitative data (Braun & Clarke, 2006). At first, the researcher carefully read and reviewed the transcripts to get familiar with the data. After that, codes are developed to categorize parts of data relevant to the study. The codes classified into main themes according to their similarities and connections. Ultimately, the themes were refined and analyzed to provide significant insights into how gamification affects the cognitive skills of fifth-grade pupils.

2.3.1 Thematic Analysis:

Become familiar with the data: Upon reviewing the responses from the eight students regarding their experience with using Kahoot games for learning mathematics, it becomes apparent that there are several recurring themes related to the role of gamification-based learning.

Generate initial codes: Initial codes can be generated based on common elements found in the students' responses, such as positive attitudes towards Kahoot, perceived improvements in learning and problem-solving, preference for Kahoot over traditional classwork, and the belief in its enhancement of lower-order thinking abilities.

Search for themes: Common patterns or themes across the responses include the effectiveness of Kahoot in learning, its enjoyable and engaging nature, improvements in problem-solving skills, and the preference for interactive learning methods.

Review themes: Reviewing the identified themes ensures they accurately represent the data and capture the essence of the students' perspectives on using Kahoot games for learning mathematics.

Define themes: Each theme can be defined based on the recurring concepts found in the responses, such as "Effectiveness of Kahoot in Learning," "Engaging and Enjoyable Learning Experience," "Improvements in LOT Skills," and "Preference for Interactive Learning."

Write-up: The thematic analysis findings compiled into a cohesive narrative, highlighting the key themes and providing supporting quotes from the students' responses. Additionally, the implications of these findings in the context of gamification-based learning and its potential impact on lower-order thinking abilities among fifth-grade students are discussed.

3 Results

Based on the thematic analysis, the following themes emerged from the students' responses:

Effectiveness of Kahoot in Learning

Students unanimously expressed that *"Kahoot games were effective tools for learning mathematics, providing immediate feedback, engagement, and a competitive learning environment as contributing factors"*. Students generally agree that Kahoot games are useful tools for learning mathematics since they attribute their efficacy to several variables. They like the prompt feedback offered by Kahoot, enabling them to assess their comprehension and correct any misunderstandings. Moreover, the engaging quality of Kahoot quizzes attracts students' interest and retains their attention throughout the learning process. Moreover, the competitive aspect of Kahoot promotes a dynamic educational setting in which students are encouraged to engage and strive for achievement actively. Overall, these characteristics enhance the quality of the learning process, emphasizing the effectiveness of Kahoot in the field of mathematics education.

Engaging and Enjoyable Learning Experience

Students found "*Kahoot games to be an enjoyable and engaging platform that provided a gaming experience intertwined with learning, particularly in mathematics, fostering positive attitudes towards its interactive nature"*.Gamified learning experiences, such as Kahoot games, not only engage and entertains students but also have a favorable effect on their level of involvement and academic achievements. The theme described that including gamification components, such as prompt feedback, competition, and score,

promotes an engaging and competitive environment among students. Therefore, it also boosts motivation and pleasure throughout the learning process. Furthermore, the interactive nature of Kahoot promotes active engagement and cooperation among students, generating a feeling of brotherhood and collaborative achievement. The combination of entertainment and education in this context enhances the attractiveness of studying mathematics and promotes a more profound comprehension and long-term retention of mathematical ideas. Hence, the extensive popularity of Kahoot among students highlights its value as a tool for fostering favorable attitudes toward the study of mathematics.

Preference for Interactive Learning

The majority of students expressed "*a preference for Kahoot games over traditional classwork due to its interactive and competitive elements. Kahoot game was more enjoyable and conducive to learning, as it provided immediate feedback and encouraged active participation".* Most students choose interactive learning tools such as Kahoot over conventional classwork because of their engaging and competitive features. These systems provide immediate feedback and promote active engagement, enhancing the enjoyment and effectiveness of learning.

Enhancement of Lower-Order Thinking Skills

Participants found that utilizing Kahoot-based games offered them valuable opportunities to engage with their learning while alleviating test anxiety and stress. It fosters a relaxed learning atmosphere akin to playing. By presenting puzzles and quizzes within time constraints, Kahoot creates a competitive and stimulating environment among peers, allowing them to exercise lower-order skills. Negotiating challenges and competition within fixed time intervals promotes the development of time management skills and enhances lower-order abilities. Students believed that "*Kahoot games significantly benefited in enhancing lower-order thinking skills. They cited fast thinking, decision-making, time management and handle challenges which fostered through Kahoot's interactive platfrom".* The use of thematic analysis sheds light on how fifth-grade students perceive gamification-based learning, especially when utilizing Kahoot, to improve their lower-order thinking skills. Students found that Kahoot greatly enhanced their ability for rapid thought, judgment, and solving issues, among other lower-order thinking skills. Because the platform is interactive, users are encouraged to participate actively, which improves their memory and retention of factual information. Immediate feedback assists students in recognizing and correcting misunderstandings. Kahoot's gamified methodology improves learning results and fosters students' cognitive development.

4 Discussion

The results of this thematic analysis highlight how fifth-grade students see Kahoot games favorably as a useful resource for mathematics instruction. Participants' overwhelming opinion that Kahoot is a good learning tool shows how well it can engage students and improve their educational experiences. The idea of a fun and interesting learning environment suggests that students connect with Kahoot's gamified approach, which enhances interaction and enjoyment in the learning process. The results align with the investigation on the effectiveness of Kahoot, an online gaming platform, in assessing engineers' motivation, engagement, pleasure, and learning objectives. The findings confirm earlier studies and imply that Kahoot has a beneficial impact on these factors. In addition, research shows how Kahoot increases students' motivation and pleasure while encouraging active involvement, improving their ability to retain information, and strengthening their problem-solving skills (Lashari et al., 2023). When students participate in different roles, problem-solving scenarios, or creative tasks, the experience component of gamification offers significant motivational incentives (Langendahl et al., 2016). This result is consistent with previous studies on the advantages of gamification in education, which indicate that adding gaming aspects to instructional activities might boost students' enthusiasm and engagement. Levels, leaderboards, point systems, badges, and other elements are often seen in gamified settings. These elements act as crucial feedback mechanisms for learning (Mekler et al., 2017).

Furthermore, the observed enhancements in students' problem-solving abilities imply that Kahoot games promote reasoning and active learning. Students may evaluate their grasp of mathematical topics in real time using Kahoot's immediate feedback, which fosters deeper learning and skill improvement. Salazar-Vallejo and Rivera-Rogel (2023) highlight how gamified exams greatly influence students' learning and encourage teachers to design dynamic classrooms that provide continuous feedback. It also facilitates a formative assessment of the material using interactive methods, which makes learning progress tracking easier. Additionally, their study shows how useful Kahoot is for final written exam preparation. Students' choice of Kahoot over conventional classwork indicates their preference for interactive learning techniques, emphasizing the value of integrating technology-driven and interactive approaches in education. Teachers may construct dynamic learning environments that accommodate a variety of learning styles and preferences by using gamification systems such as Kahoot.

Additionally, the perception held by students that Kahoot games greatly improve their ability for deeper thought emphasizes the potential of gamification-based learning to develop the cognitive skills necessary for success in the classroom. Kahoot encourages children to build intellectual abilities essential for problem-

solving and academic success by involving them in tasks that call for quick judgment and decision-making. According to Yildirim (2017), including gamification in instructional strategies improves student performance and attitudes about the courses. The findings highlighted the benefits and significance of gamification in teaching strategies. Because of its interactive nature and utility, gamification is thus highly recommended for educational processes. According to prior research by Sudarmilah and Arbain (2019), playing video games with kids greatly increases their cognitive ability. Verbal, performance, and full-scale IQ assessments all showed improvements. The research mentioned above still needs to address the lower-order thinking skills of aspiring teachers fully. As a result, Kahoot gives pupils opportunities to improve lower cognitive abilities.

5 Conclusion

The research investigating the impact of gamification-based learning, especially using Kahoot games, on the lower-level cognitive skills of fifth-grade pupils has yielded significant findings about the efficacy of this method. Several important themes were identified by thematic analysis on semi-structured interviews with eight fifth-grade pupils. First and foremost, the research discovered that Kahoot games were highly regarded as effective tools for acquiring knowledge in mathematics. Students valued the prompt feedback, active participation, and competitive educational atmosphere generated by Kahoot. Furthermore, gamification in Kahoot enhanced the learning process by creating a stimulating and pleasurable educational experience for students related to playing a game while acquiring knowledge.

Furthermore, students indicated enhancements in their problem-solving abilities, including enhanced speed and confidence, which they attributed to the interactive and engaging characteristics of Kahoot. Students exhibited a distinct preference towards interactive learning approaches such as Kahoot, as opposed to conventional classwork. They found Kahoot to be more entertaining and conducive to effective learning. Ultimately, pupils were convinced that Kahoot games improved their lower-level cognitive skills. Nevertheless, it is crucial to recognize the limitations of the research, including the limited number of participants and the concentration on a certain educational level. Subsequent studies should investigate the impact of using gamification as a learning method on student achievement in various educational settings. By acknowledging the advantages of integrating gaming aspects into academic activities, educators may create dynamic and interesting learning environments that foster student achievement. Moreover, future studies should thoroughly investigate the impact of Kahoot-based gamification on improving higher-order cognitive skills in mathematics. These researches have the potential to provide valuable insights that help improve teaching methods and enhance students' educational achievements.

6. Declarations

6.1 Ethics Approval and Consent to Participate: The researcher granted consent to participants, encompassing students of the 5th class, the School Principal, and parents, ensuring comprehensive involvement and compliance.

6.2 Conflict of Interests:

6.3 Acknowledgement: I express my sincere gratitude to my supervisor for the untiring support extended throughout the preparation of this manuscript.

References

1. Ahmed, A. A. A., Sayed, B. T., Wekke, I. S., Widodo, M., Rostikawati, D., Ali, M. H., ... & Azizian, M. (2022). An empirical study on the effects of using Kahoot as a game-based learning tool on EFL learners' vocabulary recall and retention. *Education Research International*, *2022*. https://doi.org/10.1155/2022/9739147
2. Aparicio, M., Oliveira, T., Bacao, F., & Painho, M. (2019). Gamification: A key determinant of massive open online course (MOOC) success. *Information & Management*, *56*(1), 39-54. https://doi.org/10.1016/j.im.2018.06.003
3. Srnka, K. J., & Koeszegi, S. T. (2007). From words to numbers: how to transform qualitative data into meaningful quantitative results. *Schmalenbach Business Review*, *59*, 29-57. https://link.springer.com/article/10.1007/bf03396741
4. Balaskas, S., Zotos, C., Koutroumani, M., & Rigou, M. (2023). Effectiveness of GBL in the Engagement, Motivation, and Satisfaction of 6th Grade Pupils: A Kahoot! Approach. *Education Sciences*, *13*(12), 1214. https://doi.org/10.3390/educsci13121214
5. Hidayat, R., Qi, T. Y., Ariffin, P. N. B. T., Hadzri, M. H. B. M., Chin, L. M., Ning, J. L. X., & Nasir, N. (2024). Online game-based learning in mathematics education among Generation Z: A systematic review. *International Electronic Journal of Mathematics Education*, *19*(1), em0763. https://www.iejme.com/download/online-game-based-learning-in-mathematics-education-among-generation-z-a-systematic-review-14024.pdf

6. Langendahl, P. A., Cook, M., & Mark-Herbert, C. (2016). Gamification in higher education. *Working paper series/Swedish University of Agricultural Sciences, Department of Economics*, (2016: 6). https://d1wqtxts1xzle7.cloudfront.net/78706916/langendahl_p_a_etal_160602-libre.pdf?
7. Lashari, T. A., Fiayaz, R., Lashari, S. A., Khan, I., Sultana, S., & Afzal, T. Kahoot: A game-based web tool to assess motivation, engagement fun, and learning outcomes among engineers. *Computer Applications in Engineering Education*. https://doi.org/10.1002/cae.22684
8. Li, M., Ma, S., & Shi, Y. (2023). Examining the effectiveness of gamification as a tool promoting teaching and learning in educational settings: a meta-analysis. *Frontiers in Psychology*, *14*, 1253549. https://doi.org/10.3389/fpsyg.2023.1253549
9. Maruta, S. I., Bolaji, C., Musa, M., & Ibrahim, M. O. (2022). Effects of Polya and Bransford-stein models on students' performance in trigonometry, among senior secondary school students in Kano State, Nigeria. *The Journal of the Mathematical Association of Nigeria*, *47*(2), 7-14. https://man-nigeria.org.ng/issues/ABA-EDU-2022-13.pdf
10. Mekler, E. D., Brühlmann, F., Tuch, A. N., & Opwis, K. (2017). Towards understanding the effects of individual gamification elements on intrinsic motivation and performance. *Computers in human behavior*, *71*, 525-534. https://doi.org/10.1016/j.chb.2015.08.048
11. Nzeadibe, A. C., Egara, F. O., Inweregbuh, C. O., & Osakwe, I. J. (2020). Effect of problem-solving and collaborative strategy on secondary school students' retention in geometry. *African Journal of Science, Technology and Mathematics Education*, *5*(1), 9-20.
12. Nzeadibe, A. C., Egara, F. O., Inweregbuh, O. C., & Osakwe, I. J. (2019). Effect of two meta-cognitive strategies on students' achievement in mathematics. *Journal of CUDIMAC*, *7*(1), 43-57. https://cudimac.unn.edu.ng/volume-7/
13. Pahamzah, J., Syafrizal, S., & Nurbaeti, N. (2022). The effects of EFL course enriched with Kahoot on students' vocabulary mastery and reading comprehension skills. *Journal of Language and Linguistic Studies*, *18*(1), 643-652. https://files.eric.ed.gov/fulltext/EJ1325763.pdf
14. Patton, M. Q. (2002). *Qualitative research & evaluation methods*. sage. Retrieved from: https://books.google.com.pk/books?hl=en&lr=&id=FjBw2oi8El4C&oi=fnd&pg=PR21&dq=Patton,++M.++Q.++(2002).++Qualitative++research++and++evaluation++methods.++Thousand++Oaks.++Cal.:++Sage++Publications,+4.&ots=bym_aIFDpM&sig=zBT315PCBNHm6j738SKUYr2uZl0&redir_esc=y#v=onepage&q&f=false
15. Ratinho, E., & Martins, C. (2023). The role of gamified learning strategies in student's motivation in high school and higher education: A systematic review. *Heliyon*. https://doi.org/10.1016/j.heliyon.2023.e19033
16. Salazar-Vallejo, G., & Rivera-Rogel, D. (2023, April). Gamification in Higher Education Assessment Through Kahoot. In *World Conference on Information Systems and Technologies* (pp. 147-155). Cham: Springer Nature Switzerland.
17. Sudarmilah, E., & Arbain, A. F. (2019). Using gamification to stimulate the cognitive ability of preschoolers. *International Journal of Innovative Technology and Exploring Engineering*, *8*(6), 1250-1256. https://www.ijitee.org/portfolio-item/f3867048619/
18. Yildirim, I. (2017). The effects of gamification-based teaching practices on student achievement and students' attitudes toward lessons. *The Internet and Higher Education*, *33*, 86-92. https://doi.org/10.1016/j.iheduc.2017.02.002
19. Zainuddin, Z., Chu, S. K. W., Shujahat, M., & Perera, C. J. (2020). The impact of gamification on learning and instruction: A systematic review of empirical evidence. *Educational research review*, *30*, 100326. https://doi.org/10.1016/j.edurev.2020.100326