Bringing Kahoot! Into the Classroom: The Perceived Usefulness and Perceived Engagement of Gamified Learning in Higher Education

Kevin Fuchs

***Abstract*—With the emergence and growing use of ICT, educational institutions have tried to adapt to the new standard at an exponential rate. Gamification has the potential to positively impact students' behavior, dedication, and motivation, which can lead to knowledge and skill progress if utilized and integrated appropriately. The purpose of the study is to examine perceptions from undergraduate students concerning the use of Kahoot! in their classrooms. Statistical analysis was performed on the empirical data received from a questionnaire (n = 113). The findings revealed that gamification had a positive impact on the students learning progress. However, gamification did not keep them motivated throughout the entire course. Furthermore, foreign students perceive gamified learning as more useful than their Thai peers. The results of this study have practical implications for practitioners and theoretical implications for educational researchers.**

***Index Terms*—Gamification, higher education, technology-enhanced learning, online learning.**

I. Introduction

Gamification seems to be gaining traction in a variety of industries, including business, organizational management, in-service training, health, social policy, and education [1]. The term refers to "the phenomenon of creating gameful experiences" [2] or "the usage of game mechanics in non-gaming contexts" [3]. Gamification is used in a variety of situations and for a variety of reasons. It is utilized as a motivator for activities like learning, employee performance, customer involvement, and even crowdsourcing projects [2]. Today's students are digital natives with distinct personalities. They have different learning styles, a fresh attitude toward the learning process, and higher expectations for teaching and learning because they grew up with digital tools [4].

Teachers are confronted with new obstacles and must address critical concerns connected to the customization of the learning process to the needs, preferences, and requirements of pupils. Teachers must employ a variety of teaching strategies and approaches to enable students to be active participants in their learning, with high motivation and engagement [2]. Modern pedagogical paradigms and educational trends, strengthened by the use of information and communication technology (ICT), create the conditions for the implementation of innovative approaches and strategies for active learning [5]. One of these developments is gamification in training. The current project's goal is to research and describe the nature and benefits of gamification in formal education, as well as how students perceived the applied usage in their classroom.

The learning environment in higher education substantially differs from that of final-year high school students [6]. Many students in Thailand's higher education sector, struggle with the transition from an instructivism learning culture to a constructivism learning culture [7]. While it is beyond the scope of the study to examine different learning cultures and learning styles, it should be noted that instructivism learning culture generally emphasizes that knowledge should be transferred directly into the mind of the learner from the instructor [8], whereas in constructivism learning culture learners construct knowledge rather than just passively take in information [7]. Gamification fosters active learning and the constructivism learning culture [9], therefore, in the context of this study, the nationality of the students might play a significant role in how gamification (i.e. Kahoot!) is perceived.

II. Research Aim and Conceptual Framework

It is claimed that technology-enhanced learning (TEL) supports the transformation towards active learning [9]. Moreover, gamification is considered an enhanced pedagogical way to foster knowledge transfer and construct students' learning in formal education [2]. The study aims to investigate how students perceived the integration of gamification into their higher education studies. Moreover, upon closer examination of the associated mechanisms, the study aims to examine the role of Kahoot! and to empirically explore how students view the integration of this specific tool into their classroom. The study is supported by the conceptual framework enclosed (Fig. 1).

On this basis, the following hypotheses were formulated to guide the study:

H1. Kahoot! has a positive influence towards the perceived usefulness and perceived engagement based on gender.

H2. Kahoot! has a positive influence towards the perceived usefulness and perceived engagement based on the year of study.

H3. Kahoot! has a positive influence towards the perceived usefulness and perceived engagement based on nationality.

Manuscript received April 10, 2022; revised May 5, 2022. Any opinions or conclusions expressed in this paper are solely the intellectual result of the author and do not reflect the viewpoint of the Faculty or University.

Kevin Fuchs is with the Faculty of Hospitality and Tourism, Prince of Songkla University, Phuket 83120 Thailand (e-mail: kevin.f@phuket.psu.ac.th).

doi: 10.18178/ijiet.2022.12.7.1662

H4. The perceived usefulness of Kahoot! has a positive influence towards the perceived engagement

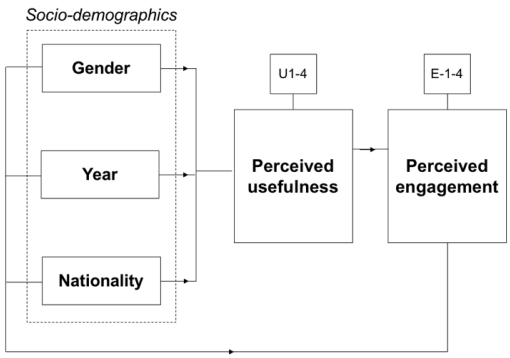

Fig. 1. The conceptual framework supporting the study.

III. Literature Review

The following subsection will introduce the current use of ICT in higher education, as well as how gamified learning fits in the context of technology-enhanced learning. Moreover, the educational tool "Kahoot!" is being introduced in the context of this study.

A. ICT in Higher Education

ICT advancements can be viewed as a blessing in disguise. On the one hand, digital material is readily available nowadays, making knowledge hardwiring less important and focusing instead on competency development. Students in higher education, it is suggested, need to develop more sensible soft skills that allow them to systematically and critically assess information in a digitalized world where information is widely accessible [10]. While knowledge can be gained in a short period, developing competencies takes more active repetition and patience. As a result, it is deemed necessary to use appropriate and supporting teaching methods [11]. Beginning with the shift from instructivism to constructivism, learning theories and applications have developed over time [11].

ICT has changed the way we interact, engage, and communicate with one another [12]. The educational sector is not immune to this trend; with the emergence and growing use of ICT, educational institutions have tried to adapt to the new standard at an exponential rate [10], [11]. The accessibility and mobility of information and communication technologies (ICT) have been a blessing in disguise, as ICT has expedited the decline of knowledge-based learning. Simultaneously, it provides a potential option for improving competency-based learning, which is considered a more relevant educational method [13]–[15]. However, the ability to examine, measure, and judge the vast amount of information available necessitates a more comprehensive development of pupils' critical judgment skills [13].

B. Gamification in Formal Education

Users are more committed and motivated to the activities and processes in which they are participating when they adopt game-based approaches. Consumers are familiar with game mechanics since they have played or continue to play a variety of games. Bovermann and Bastiaens [9] hypothesize that students and educators are also consumers, and henceforth, the familiarity with gamification can be applied to the context of education [4]. The use of game components in education makes sense because several characteristics are common to games and training. In games, users' activities are targeted at accomplishing a certain goal (win) in the face of challenges [10]. In education, it is critical to keep track of students' development to meet learning objectives. The degrees of information and skills attained by students define their learning path. Collaboration in education is a key component in implementing active learning effectively [10]

There is a learning objective in education that must be met by engaging in certain learning activities or interacting with educational content. The ability to track the progress of players in games is crucial because subsequent actions and moves are determined by their outcomes [5]. Instead of competing among students, the focus of the learning process should be on building skills for collaboration and teamwork, as well as accountability for the group's performance. Knowledge and skills are not directly linked to gamification [5]. Gamification has an impact on students' behavior, dedication, and motivation, which can lead to knowledge and skill progress [9]. Moreover, according to Murillo-Zamorano *et al*. [5], the creation of an efficient plan for implementing gamification in e-learning necessitates a thorough examination of current conditions and software tools.

C. Gamified Learning through Kahoot!

In education, game-based learning is often regarded as a good practice [16], [17]. Because it involves students in problem-solving, critical thinking, and review of content knowledge, research, and empirical data support game learning as a useful tool for educators to employ in the classroom [17]. Educators are adopting digital games, a modern version of game-based learning, to engage their students in important and engaging activities [18]. Teachers can use Kahoot! as a digital game resource to generate quizzes, surveys, and debates that engage students in content understanding in a competitive game format [19].

Kahoot! is a learning platform that combines student response systems (SRS), existing technical infrastructure in schools, students bringing their own digital devices, social networking, and games into one. The purpose of Kahoot! is to improve learning performance and classroom dynamics by increasing engagement, motivation, fun, and concentration [17], [20]. Though, a potential drawback of a technology-enhanced learning environment is that boredom can lead to poor performance and bad behavior [20]. Although Kahoot! has been shown to improve student attention, motivation, and engagement, it is uncertain whether Kahoot! produces better learning results than traditional techniques and student response systems [21].

IV. Methods and Data

The Likert-type scale is a psychometric scale that is most suited to allow individuals to express their agreement or disagreement with a particular proposition, according to a recent study [22]. The students reported their degree of agreement with a total of eight items reflecting their

perception of gamification in the classroom using a five-point Likert-type scale. The force-option scale ranged from disagree (1), somewhat disagree (2), neutral (3), somewhat agree (4) to agree (5). Moreover, these assertions were divided into two groups, each with its own set of rules. (1) the perceived usefulness and (2) the perceived engagement were the two categories. The questionnaire was validated and endorsed by two senior researchers, as well as tested for comprehension during a focus group discussion consisting of four students. The Cronbach's alpha was calculated and the corresponding values were .885 for perceived usefulness (Table I) and .839 for perceived engagement (Table II) indicating a good level of internal consistency. Moreover, the questionnaire was validated and endorsed by two senior researchers, as well as tested for comprehension during a focus group discussion consisting of four students.

TABLE I: QUESTIONNAIRE ITEMS ABOUT PERCEIVED USEFULNESS

No.	Statement
Factor: *Perceived Usefulness* (α = .885)	
U1	Kahoot! helps me to reach the course learning outcomes faster
U2	Kahoot! helps me to increase my learning productivity
U3	Kahoot! helps me to achieve a better grade for the course
U4	Kahoot! helps me to remember the course content more easily

TABLE II: QUESTIONNAIRE ITEMS ABOUT PERCEIVED ENGAGEMENT

No.	Statement
Factor: *Perceived Engagement* (α = .839)	
E1	Kahoot! makes the learning experience more interesting
E2	Kahoot! makes me feel more motivated about the course
E3	Kahoot! makes me feel confident to participate in the activity
E4	Kahoot! makes me feel more confident about the material

A total of 250 questionnaires were distributed in early 2022 with the request to participate. 113 undergraduate students participated in the survey (Table III), resulting in a response rate of 45.2 percent. At the time of sampling, the participants were enrolled as first- or second-year full-time undergraduate students in an international business degree program at the Prince of Songkla University in Phuket, Thailand. The participants' degree program or field of study did not indicate that they would have had any specific technical knowledge. However, it was a prerequisite for participation that the students had recent exposure to gamification (i.e. Kahoot!) in the classroom and reflect upon their experiences from the previous semester, i.e. August – December 2021.

TABLE III: SOCIO-DEMOGRAPHIC PROFILE OF THE PARTICIPANTS

Characteristic		Frequency	Percentage
Nationality	Thai	95	84%
	Foreign	18	16%
Gender	Female	77	68%
	Male	36	32%
Year of Study	Year 1	44	39%
	Year 2	69	61%
Age Range	19 years or under	24	21%
	20 years or above	89	79%

The study was carried out as part of a prerequisite for another non-sponsored study that aims to look into the function and influence of ICT in various learning cultures, with a focus on technology-enhanced learning in constructivist learning environments. The students were recruited through convenience sampling based on their availability. A QR code printed on A6-sized paper was distributed at the campus, wherein scanning the QR code with their mobile phone will lead the students to an electronic survey. Moreover, the open-source statistical software JASP was used to perform the data analysis. Next, the data were analyzed using descriptive analysis, which included computing the percentage distribution of replies, the average (mean value), range (lowest and greatest value), and standard deviation (SD) (standard deviation), correlation analysis, as well as independent t-tests to compare the differences in mean ratings. The results are being reported in the following sections of this paper.

V. RESULTS

The following subsections will present the empirical results of the study. The results are organized based on the research aim in order to answer how students perceive the use of Kahoot! in their classroom followed by testing the previously stated hypotheses (H1-H4).

A. *Students' Perception of Kahoot! in the Classroom*

Generally, the mean values range from 3.407 to 4.168 with a standard deviation between .959 and 1.288 for the eight items (Table IV; Fig. 2). Overall, the students reported high agreement on a total of three items based on the mode value of five, i.e. "Kahoot! helps me to reach the course learning outcomes faster" (U1; mean = 3.912), "Kahoot! helps me to increase my learning productivity" (U2; mean = 4.168), and "Kahoot! makes the learning experience more interesting" (E1; mean = 4.053). Interestingly, one item received a mode value of three, indicating neither agreement nor disagreement. The item asked the students "Kahoot! makes me feel confident to participate in the activity" (E3; mean = 3.407).

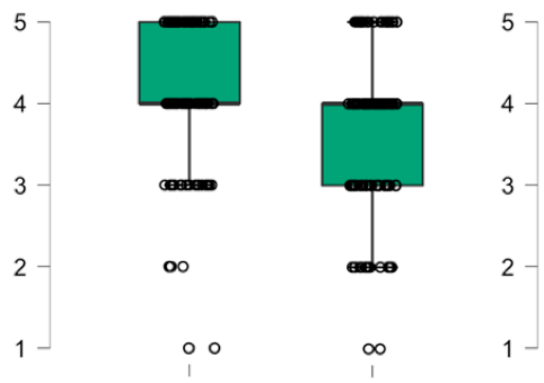

Fig. 2. Boxplot of the data distribution for perceived usefulness (left) and for perceived engagement (right) based on empirical data.

B. *Socio-demographic Influence towards Perceived Usefulness and Perceived Engagement*

As reported in Table V, independent t-tests were conducted to test differences in mean values of the perceived usefulness and perceived engagement based on three socio-demographic characteristics. Overall, female students reported higher mean values for the perceived usefulness compared to their male peers (0.145). However, the difference in mean values for the perceived engagement was

lower for female students (-0.112). However, none of the tests indicated statistically significant differences in mean scores between the two groups ($p \geq 0.435$ and $p \geq 0.575$).

Overall, the foreign students reported higher mean values for both factors, i.e. perceived usefulness (0.444) and perceived engagement (0.355), wherein Levene's test is significant ($p < 0.05$) for the perceived engagement (indicated with an asterisk), suggesting a violation of the equal variance assumption. Lastly, there is a difference in mean values for the year of study. Students in their first year of study have a slightly higher mean value for perceived usefulness, whereas students in their second year have higher mean values for perceived engagement. Furthermore, Levene's test is significant ($p < 0.05$) for the perceived engagement (indicated with an asterisk), suggesting a violation of the equal variance assumption.

TABLE IV: SUMMARIZED RESULTS FROM THE QUESTIONNAIRE BASED ON EMPIRICAL DATA

No.	Mean	SD	Min-Max	Mode	Median	Shapiro-Wilk[a]
U1	3.912	1.048	1-5	5	4	.846
U2	4.168	1.034	1-5	5	4	.774
U3	3.867	.968	1-5	4	4	.857
U4	3.788	.959	1-5	4	4	.875
E1	4.053	1.084	1-5	5	4	.806
E2	3.434	1.288	1-5	4	4	.875
E3	3.407	1.006	1-5	3	3	.901
E4	3.434	1.224	1-5	4	4	.892

[a] Based on Shapiro-Wilk value (p < .001)

TABLE V: T-TEST OF DIFFERENCES IN PERCEIVED USEFULNESS AND PERCEIVED ENGAGEMENT GROUNDED ON GENDER, NATIONALITY AND YEAR OF STUDY BASED ON EMPIRICAL DATA

Factor	Mean Values		T-Test		
			t	*p*	Mean difference
	Female (n = 77)	Male (n = 36)			
Usefulness	4.117	3.972	.783	.435	.145
Engagement	3.610	3.722	-.563	.575	-.112
	Thai (n = 95)	Foreign (n = 18)			
Usefulness	4.000	4.444	-1.915	.058	-.444
Engagement	3.589	3.944	-1.413	.160*	-.355
	Year 1 (n = 44)	Year 2 (n = 69)			
Usefulness	4.091	4.058	.186	.853	.033
Engagement	3.568	3.696	-.672	.503*	-.128

** Levene's test is significant (p < .05), suggesting a violation of the equal variance assumption*

C. Correlation Analysis between Perceived Usefulness and Perceived Engagement

All the conditions of the Pearson correlation coefficient were consistent and based upon good practice by Benesty *et al.* [23]. Overall, there is a statistically significant correlation between the perceived usefulness of Kahoot! and the perceived course engagement (< 0.001). According to Benesty *et al.* [23], an r-value between .1 and .3 signifies a small correlation, wherein a medium correlation is quantified with an r-value between 0.3 and 0.5. Lastly, a large correlation corresponds with an r-value of 0.5 or higher. Based on the pair-wise combinations, a large correlation exists between perceived usefulness and perceived engagement (.696). The scatter plots (Fig. 3) show the density of responses and how they fit the straight line. Furthermore, the Shapiro-Wilk test for bivariate normality was done and reported in Table VI.

TABLE VI: PEARSON'S CORRELATION (R) BETWEEN PERCEIVED USEFULNESS AND PERCEIVED ENGAGEMENT BASED ON EMPIRICAL DATA

Pair-wise correlation	r	p	Lower 95% CI	Upper 95% CI	Shapiro -Wilk
Perceived usefulness – perceived engagement	0.696*	< .001	0.586	0.780	0.936

** p <0 .001 indicating a statistically significant collection between the factors*

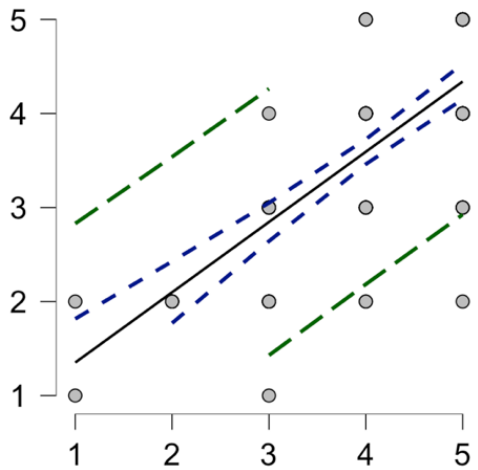

Fig. 3. Correlation plots between perceived usefulness and perceived engagement based on empirical data.

To sum up, the collected data supports the partial confirmation of the second hypothesis (H2) and third hypothesis (H3) wherein Kahoot! had a positive influence on the perceived engagement based on year of study and nationality. Moreover, a strong correlation was proven between the perceived usefulness of Kahoot! has a positive influence on the perceived engagement (H4).

VI. DISCUSSION AND CONCLUSION

Overall, it can be concluded that the students generally have a high perception towards the integration of Kahoot! into their classroom. Similarly, Bicen and Kocakoyun [24] reported that the "inclusion of gamification approach has a positive effect on student motivation" (p. 88). Hitchens and Tulloch [25] note that "that gamification can be enjoyable and educationally beneficial for a majority of students" (p.39). However, it is also noted that the game-design has a significant impact on the perceived motivation and engagement [24], [25]. As one of the emerging findings from the study, it is recommended that educators use the Kahoot application to support the students learning and ensure the students enjoy the experience.

Overall, the perceived usefulness was consistently rated higher than the perceived engagement, which could be a shortcoming of a poor gamification design or unrealistic expectations from the educator [26]. Therefore, students may benefit from engaging in gamification activities at the

beginning or end of the normal class in order to consolidate the learning material and course content as suggested by Bicen and Kocakoyun [24] in a similar study. The questionnaire items related to the perceived usefulness received higher mean ratings than the items related to their perceived engagement. As students typically need activity adaptation time, future studies should investigate the time required to adapt to these innovative activities. Moreover, the students indicated that Kahoot! helped them to reach the course learning outcomes faster as well as increase their productivity.

Likewise, the students had a relative agreement that Kahoot! made the learning experience more interesting. The process of integrating gamification methods into traditional education will have different effects on different audiences, including academics, school authorities, and students. As revealed through the statistical analysis of the empirical data, foreign students perceive gamified learning as more useful and engaging than their Thai peers. Furthermore, there is statistically significant evidence that established a strong correlation between perceived usefulness and perceived engagement. Other studies of these groups should be investigated in order to identify, what socio-demographic characteristics have different effects on the perceived usefulness and perceived engagement of gamification in the classroom as it is unlikely that Kahoot! provides a one-size-fits-all solution for educators [26], [27].

Despite the fact that limitations in research always offer the opportunity for future works, the reader is recommended to consider two particular limitations in the context of the study. Firstly, the respondents were not part of the same coursework for which they were asked to reflect upon through the questionnaire. Therefore, their experience with the elements of gamification could differ and explain part of the variance. A case study with participants from the same coursework could be a possible solution to gain a more comprehensive insight into the perceived usefulness and engagement of undergraduate students. Furthermore, the data collection was carried out in person at the campus, however, their reflections are based upon their experience during online learning as a result of the ongoing global pandemic. Another area of future research would be to investigate why the perceived usefulness was rated higher than perceived engagement, which is in contrast to previous studies.

Conflict of Interest

The author declares that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

[1] N. S. Jayawardena, M. Ross, S. Quach, A. Behl, and M. Gupta, "Effective online engagement strategies through gamification: A systematic literature review and a future research agenda," *Journal of Global Information Management*, vol. 30, no. 5, pp. 1-25, 2021.

[2] R. S. Alsawaier, "The effect of gamification on motivation and engagement," *The International Journal of Information and Learning Technology*, vol. 35, no. 1, pp. 56-79, 2018.

[3] M. Sailer and L. Homner, "The gamification of learning: A meta-analysis," *Educational Psychology Review*, vol. 32, no. 1, pp. 77-112, 2020.

[4] A. Rapp, F. Hopfgartner, J. Hamari, C. Linehan, and F. Cena, "Strengthening gamification studies: Current trends and future opportunities of gamification research," *International Journal of Human-Computer Studies*, vol. 127, pp. 1-6, 2019.

[5] L. R. Murillo-Zamorano, J. Á. L. Sánchez, A. L. Godoy-Caballero, and C. B. Muñoz, "Gamification and active learning in higher education: Is it possible to match digital society, academia and students' interests?" *International Journal of Educational Technology in Higher Education*, vol. 18, no. 1, pp. 1-27, 2021.

[6] E. Bone and R. Reid, "First course at university: Assessing the impact of student age, nationality and learning style," *International Journal of First Year in Higher Education*, vol. 4, no. 1, pp. 95-107, 2013.

[7] C. Mangkhang and G. Piriyatachagul, "Development of area-based learning innovation through Miang culture to promote green citizenship for social studies teachers in the Upper Northern Thailand," *International Journal of Educational Policy Research and Review*, vol. 7, no. 1, pp. 16-26, 2020.

[8] K. O'Connor, "Constructivism, curriculum and the knowledge question: tensions and challenges for higher education," *Studies in Higher Education*, vol. 47, no. 2, pp. 412-422, 2020.

[9] K. Bovermann and T. J. Bastiaens, "Towards a motivational design? Connecting gamification user types and online learning activities," *Research and Practice in Technology Enhanced Learning*, vol. 15, no. 1, pp. 1-18, 2020.

[10] M. E. Parra-González, J. López Belmonte, A. Segura-Robles, and A. F. Cabrera, "Active and emerging methodologies for ubiquitous education: Potentials of flipped learning and gamification," *Sustainability*, vol. 12, no. 2, p. 602, 2020.

[11] A. Panagiotarou, Y. C. Stamatiou, C. Pierrakeas, and A. Kameas, "Gamification acceptance for learners with different E-skills," *International Journal of Learning, Teaching and Educational Research*, vol. 19, no. 2, pp. 263-278, 2020.

[12] K. Fuchs, "An exploratory interview study about student perceptions of using social media to facilitate their undergraduate studies," *Frontiers in Education*, vol. 7, p. 834391, 2022.

[13] I. J. Sistermans, "Integrating competency-based education with a case-based or problem-based learning approach in online health sciences," *Asia Pacific Education Review*, vol. 21, no. 4, pp. 683-696, 2020.

[14] K. Fuchs, "Advances in tourism education: A qualitative inquiry about emergency remote teaching in higher education," *Journal of Environmental Management and Tourism*, vol. 12, no. 2, pp. 538-543, 2021.

[15] L. M. Putz, F. Hofbauer, and H. Treiblmaier, "Can gamification help to improve education? Findings from a longitudinal study," *Computers in Human Behavior*, vol. 110, p. 106392, 2020.

[16] K. Johns, "Engaging and assessing students with technology: A review of Kahoot!" *Delta Kappa Gamma Bulletin*, vol. 81, no. 4, pp. 89-95, 2015.

[17] D. O. Göksün and G. Gürsoy, "Comparing success and engagement in gamified learning experiences via Kahoot and Quizizz," *Computers & Education*, vol. 135, pp. 15-29, 2019.

[18] E. Zarzycka-Piskorz, "Kahoot it or not? Can games be motivating in learning grammar?" *Teaching English with Technology*, vol. 16, no. 3, pp. 17-36, 2016.

[19] P. Bawa, "Using Kahoot to inspire," *Journal of Educational Technology Systems*, vol. 47, no. 3, pp. 373-390, 2019.

[20] A. I. Wang and R. Tahir, "The effect of using Kahoot! For learning — A literature review," *Computers & Education*, vol. 149, p. 103818, 2020.

[21] S. A. Licorish, H. E. Owen, B. Daniel, and J. L. George, "Students' perception of Kahoot!'s influence on teaching and learning," *Research and Practice in Technology Enhanced Learning*, vol. 13, no. 1, pp. 1-23, 2018.

[22] A. Joshi, S. Kale, S. Chandel, and D. K. Pal, "Likert scale: Explored and explained," *British Journal of Applied Science & Technology*, vol. 7, no. 4, pp. 396-403, 2015.

[23] J. Benesty, J. Chen, Y. Huang, and I. Cohen, "Pearson correlation coefficient," *Noise Reduction in Speech Processing. Springer Topics in Signal Processing*, vol. 2, Springer, Berlin, Heidelberg, 2009.

[24] H. Bicen and S. Kocakoyun, "Perceptions of students for gamification approach: Kahoot as a case study," *International Journal of Emerging Technologies in Learning*, vol. 13, no. 2, pp. 72-93, 2018.
[25] M. Hitchens and R. Tulloch, "A gamification design for the classroom," *Interactive Technology and Smart Education*, vol. 15, no. 1, pp. 28-45, 2018.
[26] Z. Zainuddin, S. K. W. Chu, M. Shujahat, and C. J. Perera, "The impact of gamification on learning and instruction: A systematic review of empirical evidence," *Educational Research Review*, vol. 30, p. 100326, 2020.
[27] C. E. Lopez and C. S. Tucker, "The effects of player type on performance: A gamification case study," *Computers in Human Behavior*, vol. 91, pp. 333-345, 2019.

Copyright © 2022 by the authors. This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited (CC BY 4.0).

Kevin Fuchs is a lecturer in the Faculty of Hospitality and Tourism at the Prince of Songkla University in Phuket, Thailand. He graduated with a M.Sc. in computer science from Linnaeus University, Sweden and has developed a keen research interest in topics that revolve around technology-enhanced learning (TEL). He has published articles in several international journals and presented his work at international conferences.