Borneo Engineering & Advanced Multidisciplinary International Journal (BEAM)
Volume 3, Issue 2, November 2024, Pages 40-48

# Gamification via Kahoot! A Motivated Learning Tool for TVET Students

Fiffy Rozainie Jifen[1]*, Siti Faiqah Shahrul Nizam[1], Habsah Mohamad Sabli[1]

[1]Department of Commerce, Politeknik Mukah, KM 7.5 Jalan Oya, 96400 Mukah, Sarawak, Malaysia

*Corresponding author: fiffyrozainie@pmu.edu.my
Please provide an **official organisation email** of the corresponding author

**Full Paper**

**Article history**
Received
*2 September 2024*
Received in revised form
*9 September 2024*
Accepted
*28 September 2024*
Published online
*1 November 2024*

## Abstract

The Ministry of Education Malaysia lauds transformative pedagogy in Malaysia, as outlined in the Malaysia Education Blueprint 2015-2025 (Higher Education), to empower learners with essential skills needed in the Fourth Industrial Revolution (IR4.0). This study investigates the level of students' perceptions towards gamification via Kahoot! use during classroom lessons within the Technical and Vocational Education and Training (TVET) students that not only affect students' attitudes but also their motivation to learn. This study was conducted in Polytechnic Mukah, Sarawak consisted of 330 respondents from different departments actively studying in Session 2 2023/2024. Overall, results indicated that the level of perceptions toward gamification via Kahoot! is high, along with attitude and students' motivation to use Kahoot! for learning. The mean score for students' motivation shows a very high result of m=4.21, followed by perceptions of m=4.15 and the lowest student attitudes of m=4.13. Then, the T-Test results show no significant difference in the level of perception towards gamification via Kahoot by gender, with the value of p=0.812>0.05. Further statistical tests of a one-way ANOVA revealed no significant difference in the level of perceptions towards Kahoot! based on students' programs with show p = 0.344 > 0.05. This study indicates that implementing Kahoot! as a teaching and learning aid is highly well-perceived by TVET students.

*Keywords: - Gamification, attitudes, motivation, perceptions*



## 1. Introduction

Implementing gamification through Kahoot! in teaching and learning has emerged as a prominent digital pedagogy aimed at enhancing the quality of education. Today's technology not only improves the quality of learning but promotes interactive learning through social skills, critical thinking, and problem-solving due to fun, pleasant experiences from competitive learning games (Fonseca et al., 2023). Recognizing the importance of preparing globally competitive students in the 21st century, the Malaysian Government plans to integrate technology into its education system as outlined in Malaysia Education Blueprint 2015-2025 (Higher Education). However, achieving the desired outcome of knowledge, skills, and competency among Technical and Vocational Education and Training (TVET) students remains a pressing issue, particularly considering the challenges posed by the Fourth Industrial Revolution (IR4.0). Game-based learning offers an engaging approach to lectures that not only fosters cognitive development but enriches the learning experience. Numerous studies have shown that utilizing Kahoot! for game-based learning yields positive effects, enhancing academic performance for both students and teachers (Wang & Tahir, 2020; Kıyançiçek & Uzun, 2022).

Nevertheless, further research is warranted to explore the impact of game-based learning environments on students' acceptance, especially concerning Kahoot! effectiveness in facilitating learning progress. Despite the widespread integration of gamification using platforms

like Kahoot! In educational settings, Technical and Vocational Education and Training (TVET) students continue to face challenges in acquiring the necessary knowledge, skills, and competencies vital for success in the evolving landscape of the Fourth Industrial Revolution (IR4.0). Recent studies have emphasized the importance of understanding the nuanced impact of gamified learning environments, such as those facilitated by Kahoot, on students' acceptance and learning outcomes. For instance, Al Ghawail & Ben Yahia (2022) stated the positive effects of Kahoot! on enhancing academic performance, indicating its potential to address the educational needs of TVET students. However, there remains a critical gap in research regarding the comprehensive assessment of students' acceptance and the effectiveness of gamification in fostering learning progress within the student's context (Neerupa & William, 2024; Huang & Zhang, 2024). This necessitates further investigation to elucidate the factors influencing students' engagement and receptiveness towards gamified learning approaches, particularly those utilizing Kahoot! in TVET institutions.

Moreover, while initial impressions of gamification using Kahoot have been favorable among TVET students, there is a pressing need to delve deeper into their attitudes, motivation, and perceptions towards this innovative pedagogical tool. Recent research by Kussin et al. (2023) highlights the immediate enthusiasm engendered by Kahoot, in higher education settings, suggesting its potential to enhance student satisfaction and emotional connection with the learning process. However, to fully harness the benefits of gamification for TVET students, exploring their specific needs and challenges within this framework is imperative. Understanding the extent of TVET students' acceptance and utilization of Kahoot! for gamified learning experiences is crucial for optimizing educational outcomes and ensuring alignment with the goals outlined in the Malaysia Education Blueprint 2015-2025 (Higher Education). Huang & Zhang (2024) highlight different studies are highly recommended to conduct more comprehensive investigations to understand the acceptance of gamification and its impact on learning performance. Therefore, rigorous investigation into the factors influencing TVET students' engagement with Kahoot! is essential for informing evidence-based practices and enhancing the quality of education in TVET institutions.

The competitive nature of Kahoot! not only stimulates motivation, excitement, and engagement but also enhances students' knowledge and skills in alignment with learning outcomes. This study investigates the level of acceptance in students' attitudes and motivation through their perceptions toward gamification learning via Kahoot! during classroom lessons within the TVET context. Specifically, this study sought to determine which factors influence students learning via Kahoot! It aims to ascertain the perceptions of gamification learning amongst TVET students and to explore the different acceptance amongst TVET students towards gamification learning using Kahoot! By identifying factors influencing TVET students' education, the utilization of Kahoot! for lessons can be highlighted for future implementation. This research aims to inform improvements in learning environments, thereby enhancing student engagement, focus, and interest through integrating technology in teaching and learning.

Hence, to study the problem area of gamification learning using Kahoot! towards TVET students, this study was undertaken to address the following questions: Which factors influence students' learning via Kahoot! as an interactive learning tool during classroom lessons? What is the effect of gamification implementation during classroom lessons on TVET students? Lastly, is there a difference in gender and course toward perceptions in gamification via Kahoot! for learning?

Herewith, the following hypotheses were formulated to guide the study:

*H1. Gender differences will significantly affect student perceptions toward gamification via Kahoot! in learning.*

*H2. Course differences will significantly affect students' perceptions toward gamification via Kahoot! in learning.*

## 2. Literature Review

### *2.1 Gamification*

The term for gamification concept first emerged in 2008 and gained remarkable upwards in the 2010s onwards (Krath et al., 2021; Deterding et al., 2011; Seaborn & Fels, 2015). Bozkurt & Durak (2018) prove this claim through Google trend analysis keywords for "gamification, gamify, and gamified" where the graph continues to grow steadily and become a trending search. According to Gómez Chova et al. (2019), the gamification implementation includes attractive components of games and video games applied in diverse situations and environments that increase motivation and revolve around problem-solving skills through greater involvement. Lopes et al. (2019) stated that applying gamification in education obtains more attention in Higher Education Institutions and for that reason, the use of Kahoot! during lessons is highly valued and greatly aids the learning process.

Moreover, a systematic review study by Chang & Hwang (2019) concluded that digital game-based learning has been shown to have vital roles in education areas. As mentioned by Barragán-Pulido et al. (2023), digital pedagogy has evolved swiftly, integrating technologies into a hybrid learning environment. This encompasses the need for educators and students to acquire digital skills. The difficulty in learning can be a challenging issue for educators and learners, but incorporating gamification in learning has fostered new pedagogical interventions to support more prominent teaching and learning activities (Kaddari et al., 2021).

### *2.2 Attitudes*

Meanwhile, a study by Roll et al. (2018) affirms that students with positive attitudes are more likely to succeed and overcome difficulties in learning to achieve their goals

despite lacking directive support. Sercanoglu et al. (2021) discovered that learning activities with Kahoot! bring positive effects on students' attitudes supported in their studies. Similarly, the study by (Debbita et al., 2018; Wang & Tahir, 2020; Yürük, 2020) also revealed the same results for a positive effect on students' attitudes towards their learning course using Kahoot! Thus, they feel more motivated, and it increases their learning performance. Iqbal et al. (2023) postulated that a multidimensional scale of students' attitudes, including the cognitive, affective, and behavioural aspects affects their learning outcomes. Thus, having a positive attitude will ensure students' success since attitude correlates with motivation and sustainability and vice versa (Santos-Villalba et al., 2020).

### *2.3 Motivation*

Online teaching tools such as Kahoot! offers an exciting learning environment that ensures students' engagement and motivation during lectures (Raju et al., 2021). According to Gupta & Goyal (2022), additional elements of "meaningfulness" in the game design enhance engagement during the gamification process for students, and it is likely relatable to the self-determination theory by Deci & Ryan (2000). Individual self-determined behaviour is directly and positively related to intrinsic motivation as postulated by Deci & Ryan (2002) that autonomy, competence, and relatedness are the basic individual needs to achieve psychological growth. The tendency to succeed is influenced by both individual and social factors by considering their intrinsic and extrinsic motivation. Zaccone & Pedrini (2019) suggested that intrinsic motivation should be the focus in the educational setting since this will contribute to the effectiveness of the learning. Even a study by Benhadj et al. (2019) also clarified that students are willing and ready to try Kahoot! in their learning because they enjoyed the competition and were intrinsically motivated to win the game.

During gamification, students controlled their learning outcomes by applying their knowledge within the context of the game. Elements of gamification attract attention and develop motivation to win the games. Alsadoon (2023) proves the effectiveness of implementing gamification in learning by developing student motivation and engagement due to positive reinforcement and immediate feedback. In addition, these positive results are consistent with other previous studies that support the claim (Rojas-López et al., 2019; Tóth et al., 2019). Even introverted students who use gamification in learning can change their behaviour by showing more interest and engaging with the activities (Smiderle et al., 2020). Even more, a mixed-method study (Hazeline et al., 2021; Nirwana & Nur, 2023) discovered that students love Kahoot! even though the complexity of the subject is a big challenge, it proves that Kahoot! can improve in academically due to the motivation to learn.

### *2.4 Perception*

Badawi & Drăgoicea (2023) stated that integrating Information and Communication Technology (ICT) into TVET is the most noted challenge faced by students and educators. Therefore, an investigation by Davis (1989) highlights two theoretical understandings, perceived usefulness and perceived ease of use, which are correlated as they accept the technology in life. Further, Davis (1989) also emphasizes user acceptance in technology use, which will be reflected in their behaviour. A recent study by Idowu et al. (2020) revealed that students perceive Kahoot in their learning, and it is preferable by students due to the ease of use and usefulness in learning. Meanwhile, Tamilarasu & Parilah (2020) found that students perceived Kahoot! due to fun learning experiences that enhance motivation, engagement, and interest in learning. Even a study by Wirani et al. (2021) revealed that perceived usefulness and individual impact encourage the continued use of Kahoot! for learning, whereby satisfaction, enjoyment, and competitiveness are significant elements in gamification to improve students' achievement.

At the same time, there exists a plethora of studies revealing gender-related differences in gamification via Kahoot! for learning. A study by Elkhamisy & Wassef (2021) discover that females were found to be more in favor of the interactive use of Kahoot! as an online game-based learning tool. Fuchs (2022) found that female students perceived usefulness in Kahoot! more than their male peers while learning. Contradictorily, López-Martínez, et al. (2022) discovered that males tend to perceive more competence and relaxation during gamification via Kahoot! but showed less interest and enjoyment during the learning process. Even more, the results from a previous study by Ismail & Mohammad (2017) discover that both genders of Malaysian medical students had different perceptions toward the ability of Kahoot! to motivate them to learn, whereby males scored higher than females. In contrast, this result differs from the study by Chiang (2020), which revealed that there were no statistically significant gender differences in students' perceptions of using Kahoot! as an English learning tool during classroom lessons.

In short, after reviewing different studies details of students' positive and negative perceptions using Kahoot! the results also depend on the complexity of the learning subject. Even learning content and cultural differences also may have different effects (Licorish & Lötter, 2022). Felszeghy et al. (2019) find that the limitation of Kahoot! in covering complex subjects as it offers a generic reflection tool for a wide variety of educational content can be an inability in Kahoot! Regarding this, some traditionally-minded students prefer non-digital learning material (Neureiter et al., 2020). Therefore, determining different perceptions of Kahoot! in different courses can be valuable for future research.

## 3. Methodology

This study was conducted quantitatively on students of Technical and Vocational Education and Training (TVET) based Diploma programs at Polytechnic Mukah, Sarawak.

The questionnaire was distributed via Google Forms as a research instrument to investigate students' attitudes, motivation, and perception of gamification using Kahoot! The findings of this study were reported descriptively based on statistical results.

### *3.1 Sample of Study*

The study population is based on the population size proposed by Krejcie & Morgan (1970), whereby 330 students over 2152 from different departments responded to this questionnaire. Students were active for Session 2 2023/2024 and the sampling method used is simple random sampling. Every student from different departments had an equal chance of participating and the results were then tabulated.

### *3.2. Instrument of Study*

A previously designed questionnaire from Ismail et al. (2018) is adopted in this study. It consists of 4 parts which are respondents' demographic data for Section A. Sections B, C, and D comprise respondents' attitudes, motivations, and perceptions toward gamification learning via Kahoot! with a scale from 1 (Strongly Disagree) to 5 (Strongly Agree). Ismail et al. (2018) clarify that the instrument's reliability is good and acceptable based on the Alpha Cronbach value of 0.80 and it is proven in this study. All components in the instrument were highly accepted with a reliability test value of 0.98. The data was then analyzed by SPSS statistical software (SPSS V27.0) and the results were shown in Table 1.

## 4. Result and Discussion

The study findings in Table 1 present 136 male (41.2%) and 194 female (58.8%) students who participated in this study. Most of the students' age range from around 18 to 21 years, with a total percentage of 88.2%. Most of the respondents were from *Bumiputera* ethnic groups representing 229 (69.4%) students.

Table. 1. Demographic data

| | | ***Sample*** | ***Percent (%)*** |
|---|---|---|---|
| **Gender** | Male | 136 | 41.2% |
| | Female | 194 | 58.8% |
| **Age** | 18 - 21 | 291 | 88.2% |
| | 22 - 25 | 36 | 10.9% |
| | 26 - 29 | 2 | 0.6% |
| | 30 and above | 1 | 0.3% |
| **Race** | Malay | 80 | 24.2% |
| | Chinese | 21 | 6.4% |
| | Indian | 0 | 0.0% |
| | Other | 229 | 69.4% |

Meanwhile, Table 2 presents respondents' demographic backgrounds by department. There were 5 departments in which the highest number of respondents were from JP (60.3%), JKA (11.8%), JKE (11.2%), JTMK (9.4%), and lowest JKM (7.3%).

Table. 2. Demographic by department

| *Department* | *Sample* | *Percent %* |
|---|---|---|
| Department of Civil Engineering (JKA) | 39 | 11.8% |
| Department of Electrical Engineering (JKE) | 37 | 11.2% |
| Department of Mechanical Engineering (JKM) | 24 | 7.3% |
| Department of Information and Communication Technology (JTMK) | 31 | 9.4% |
| Department of Commerce (JP) | 199 | 60.3% |

As shown in Table 3, students' motivation shows a very high result of mean 4.21 followed by perceptions of 4.15 and the lowest student attitudes of 4.13.

Table. 3. Mean attitudes, motivation, and perceptions

| **Variable** | **N** | **Mean** | **Std. Deviation** | **Level** |
|---|---|---|---|---|
| Attitudes | 330 | 4.1351 | 0.77493 | High |
| Motivation | 330 | 4.2108 | 0.75100 | High |
| Perceptions | 330 | 4.1589 | 0.73508 | High |

In Table 4, results for attitude in Section B show that the highest mean is item B1 of 4.25 and the lowest for a standard deviation of 0.811; I'm interested in attending classes that use Kahoot! in the teaching and learning process. The minimum mean value for attitude was item B3 of 4.01 and the highest for a standard deviation of 0.925; I like to stand out while learning using Kahoot! method. Meanwhile, for Section C the highest mean value for motivation is item C2 of 4.25 with the lowest standard deviation of 0.805; I am happy to compete with my classmates using Kahoot! in the classroom. The minimum mean value shown in item C1 of 4.18 and the standard deviation of 0.812; I like to learn using Kahoot! as it is challenging. Other than that, the minimum mean value is also shown in item C6 of 4.18 but a different standard deviation of 0.839; I like lecturers who incorporate Kahoot! in teaching aids.

Table 4. Mean and standard deviation towards student construct

| **Constructs** | | | |
|---|---|---|---|
| Student attitudes toward gamification via Kahoot! | | *Mean* | *SD* |
| B1. | I'm interested in attending classes that use Kahoot! in the teaching and learning process. | 4.25 | 0.811 |
| B2. | I am fully concentrated in the teaching and learning process that integrates gamification via Kahoot! | 4.07 | 0.881 |
| B3. | I like to stand out while learning using Kahoot! method. | 4.01 | 0.923 |
| B4. | I appreciate the lecturer who integrated Kahoot! during the teaching and learning process. | 4.21 | 0.873 |
| B5. | I focused when teaching and learning using the gamification via Kahoot method. | 4.12 | 0.890 |

| | | | |
|---|---|---|---|
| B6. | I respond positively when the teaching and learning process using Kahoot! is executed. | 4.12 | 0.825 |
| B7. | Gamification via Kahoot! makes me not stressed to learn a lesson. | 4.16 | 0.898 |
| Student motivation toward gamification via Kahoot! | | | |
| C1. | I like to learn using Kahoot! as it is challenging. | 4.18 | 0.812 |
| C2. | I am happy to compete with my classmates using Kahoot! in the classroom. | 4.25 | 0.805 |
| C3. | I feel appreciated for the display of the available Kahoot! marks. | 4.19 | 0.816 |
| C4. | I feel challenged by the rank of friends who scored high in Kahoot! during the teaching and learning process. | 4.21 | 0.848 |
| C5. | I am excited to practice Kahoot! because of its creative learning content. | 4.23 | 0.812 |
| C6. | I like lecturer who incorporate Kahoot! in teaching aids. | 4.18 | 0.839 |
| C7. | I am involved in Kahoot! to gain high marks. | 4.24 | 0.810 |
| Student perception toward gamification via Kahoot! | | | |
| D1. | I understand clearer the content of learning by using Kahoot! | 4.06 | 0.847 |
| D2. | I was given the opportunity to explore learning using Kahoot! on my own | 4.14 | 0.789 |
| D3. | I feel using Kahoot! to review learning is an interesting way. | 4.18 | 0.783 |
| D4. | I can adjust myself to using Kahoot! in no time. | 4.13 | 0.807 |
| D5. | I like the content using Kahoot! because it is easy to understand. | 4.16 | 0.794 |
| D6. | Learning via Kahoot! encourages me to think. | 4.22 | 0.787 |
| D7. | The use of gamification using Kahoot! can stimulate interest in learning. | 4.22 | 0.785 |

In Section D two items met the highest mean value for perceptions which is item D6 with a standard deviation of 0.787; Learning via Kahoot! encourage me to think. In addition, item D7 with a mean of 4.22 and the lowest standard deviation of 0.785; The use of gamification using Kahoot! can stimulate interest in learning. The minimum mean value perception is item D1; I understand clearer the content of learning by using Kahoot! with a mean of 4.06 and a standard deviation of 0.847.

The results in Table 5 compare attitudes, motivation, and student's perceptions towards gamification learning using Kahoot! It shows that male students have a higher mean for each component rather than female students. The highest mean is in the motivation of 4.28 (male) and the lowest of 4.11 (female) in perceptions. This finding ties well with other previous studies since male are more frequently involved with game activity Bernik et al. (2019). López-Martínez, et al. (2022) also sum that males obtain better results in the inclusion of gamification in learning than females concerning their perceived competence with ICT.

Table. 5. Mean and standard deviation for students' attitude, motivation, and perception by gender

| Gender | | Attitudes | Motivation | Perceptions |
|---|---|---|---|---|
| Male | Mean | 4.16 | 4.28 | 4.22 |
| | N | 136 | 136 | 136 |
| | Std. Deviation | 0.82 | 0.75 | 0.74 |
| Female | Mean | 4.12 | 4.16 | 4.11 |
| | N | 194 | 194 | 194 |
| | Std. Deviation | 0.74 | 0.75 | 0.73 |

Based on Table 6, the study results are to ascertain whether there are differences in perceptions of gamification via Kahoot! in terms of gender. Table 6 shows the t-value between male and female is t(330)=1.431 and a significant value of p=0.812>0.05. Therefore, the null hypothesis ***(Ho1)*** is accepted. There is no significant difference between gender and students' perceptions towards gamification via Kahoot! for learning (Denden et al., 2021). This result is also in line with the study by (Almusharraf et al., 2023; Chiang, 2020; Covrig et al., 2023) which both males and females react similarly toward Kahoot! in learning.

Table. 6. T-test analysis to show the difference between genders and students' perceptions

| Variable | N | Mean | SD | df | t | Sig. |
|---|---|---|---|---|---|---|
| Male | 136 | 4.22 | 0.74 | 328 | 1.431 | 0.812 |
| Female | 194 | 4.11 | 0.72 | | | |

*significant value at $\alpha < 0.05$

Table 7 shows varying degrees of perceptions between students' departments. A one-way ANOVA parametric test was used to view a variable mean of five departments. The results for differences between perceptions of gamification based on students' programs show $p = 0.344 > 0.05$. The null hypothesis *(Ho2)* is accepted, there is no significant difference between perceptions based on student programs. Thus, student course did not influence their perceptions towards gamification via Kahoot! and generally, most students love incorporated learning using Kahoot! The results consistent with Kwon & Özpolat (2020) suggests that assessment in gamification has contradict effect on perceptions of satisfaction and course experience, but their perceived learning tend to be no significant different between difference groups. This finding also consistent with other previous studies that students from different courses were positively perceived the integration use of Kahoot! in learning (Claudio et al., 2020; Fuchs, 2022; Neureiter et al., 2020).

Table 7. ANOVA analysis by departments

| Perceptions | *df* | *MS* | *F* | *Sig.* |
|---|---|---|---|---|
| Between Groups | 4 | 0.607 | 1.126 | 0.344 |
| Within Groups | 325 | 0.540 | | |

*significant value at $\alpha < 0.05$

In view of the results, corroborating both hypotheses shows gender and courses do not affect students' perceptions towards gamification via Kahoot! since learners love the class that integrates Kahoot! into their learning (Hazeline et al., 2021; Nirwana & Nur, 2023; Putu Ade Resmayania & Nyoman Tri Darma Putrab, 2019). In this aspect, the competitive nature of Kahoot! literally improve positive learning experiences among learners and enhance classroom dynamics compared to traditional learning methods.

## 5. Conclusion

The objective of this study was to investigate the level of acceptance in students' attitudes and motivation through their perceptions toward gamification learning via Kahoot! The results indicate that Kahoot! increase learning motivation (Khairani et al., 2018) and empower unique learning styles through differences (Ghaban & Hendley, 2019). The essential factors of attitudes and motivation are important to increase students' performance and engagement in learning. This approach proves that students' perceptions were highly positive towards gamification activities and educational strategies can be reviewed for full support in gamification for learning. At the same time, socio-demographic factors in terms of gender and courses do not have any effect in perceptions toward gamification via Kahoot! supported by previous literature. In the context of TVET students, it is revealed that students' preference uses Kahoot in learning. Nevertheless, deep empirical research is needed to address gamification effects to ensure the effectiveness of game-based learning aligns with outcome-based education (OBE). Lastly, for future research, a more holistic perspective should be investigated and seeks to provide more evaluating perspectives between factors that influence learning thus bringing more concrete results on perceptions of gamification via Kahoot! in the framework of TVET institutions.

## Acknowledgement

The authors would like to express their deepest appreciation to all Commerce Department lecturers for valuable knowledge sharing during the process of this study. Apart from that, thank all students participating in this educational research study for their time and effort.

## References

Al Ghawail, E. A., & Ben Yahia, S. (2022). Using the E-Learning Gamification Tool Kahoot! to Learn Chemistry Principles in the Classroom. *Procedia Computer Science*, *207*, 2667–2676. https://doi.org/10.1016/j.procs.2022.09.325.

Almusharraf, N., Aljasser, M., Dalbani, H., & Alsheikh, D. (2023). Gender Differences in Utilizing a Game-Based Approach Within the EFL Online Classrooms. *Heliyon*, *9*(2), 1–8. https://doi.org/10.1016/j.heliyon.2023.e13136.

Alsadoon, H. (2023). The Impact of Gamification on Student Motivation and Engagement: An Empirical Study. *Dirasat: Educational Sciences*, *50*(2). https://doi.org/10.35516/edu.v50i2.25.

Badawi, S., & Drăgoicea, M. (2023). Exploring the Challenges and Opportunities of Integrating ICT in TVET. *UPB Scientific Bulletin, Series C: Electrical Engineering and Computer Science*, *85*(3), 49–64.

Barragán-Pulido, S., Barragán-Pulido, M. L., Alonso-Hernández, J. B., Castro-Sánchez, J. J., & Rabazo-Méndez, M. J. (2023). Development of Students' Skills through Gamification and Serious Games: An Exploratory Study. *Applied Sciences (Switzerland)*, *13*(9), 1–16. https://doi.org/10.3390/app13095495.

Benhadj, Y., Messaoudi, M. El, & Nfissi, A. (2019). Investigating the Impact of Kahoot! on Students' Engagement, Motivation, and Learning Outcomes: Ifrane Directorate as a case study. *International Journal of Advance Study and Research Work*, *2*(6), 2581–5997. https://doi.org/10.5281/zenodo.3250661.

Bernik, A., Vusić, D., & Milković, M. (2019). Evaluation of Gender Differences Based on Knowledge Adaptation in the Field of Gamification and Computer Science. *International Journal of Emerging Technologies in Learning*, *14*(8), 220–228. https://doi.org/10.3991/ijet.v14i08.9847.

Bozkurt, A., & Durak, G. (2018). A Systematic Review of Gamification Research: In Pursuit of Homo Ludens. *International Journal of Game-Based Learning*, *8*(3), 15–33. https://doi.org/10.4018/IJGBL.2018070102.

Chang, C. Y., & Hwang, G. J. (2019). Trends in digital game-based learning in the mobile era: A systematic review of journal publications from 2007 to 2016. *International Journal of Mobile Learning and Organisation*, *13*(1), 68–90. https://doi.org/10.1504/IJMLO.2019.096468.

Chiang, H. H. (2020). Kahoot! In an EFL Reading Class. *Journal of Language Teaching and Research*, *11*(1), 33–44. https://doi.org/10.17507/jltr.1101.05.

Claudio, C.-M., Mauricio, V.-C., & Leonardo, V. (2020). Game-Based Student Response Systems: The Impact

of Kahoot in a Chilean Vocational Higher Education EFL Classroom Claudio. *Call-Ej*, *21*(1), 64–78.

Covrig, M., Agoston, S. I. G., Igreț, R. Ștefania, Marinaș, C. V., Miron, A. D., & Roman, M. (2023). Students' Engagement and Motivation in Gamified Learning. *Amfiteatru Economic*, *25*(Special Issue 17), 709–730. https://doi.org/10.24818/EA/2023/S17/1003.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *Management Information Systems Quarterly*, *Vol 13*, *No*, 319–340. https://doi.org/10.2307/249008.

Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01.

Deci, E. L., & Ryan, R. M. (2002). Overview of self-determination theory: An organismic dialectical perspective. *Handbook of Self-Determination Research*, *19*(January), 109–120.

Denden, M., Tlili, A., Essalmi, F., Jemni, M., Chen, N. S., & Burgos, D. (2021). Effects of gender and personality differences on students' perception of game design elements in educational gamification. *International Journal of Human Computer Studies*, *154*, 102674. https://doi.org/10.1016/j.ijhcs.2021.102674.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From Game Design Elements to Gamefulness: Defining Gamification. *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments, MindTrek 2011*, *March 2014*, 9–15. https://doi.org/10.1145/2181037.2181040.

Elkhamisy, F. A. A., & Wassef, R. M. (2021). Innovating pathology learning via Kahoot! game-based tool: a quantitative study of students` perceptions and academic performance. *Alexandria Journal of Medicine*, *57*(1), 215–223. https://doi.org/10.1080/20905068.2021.1954413.

Fonseca, I., Caviedes, M., Chantré, J., & Bernate, J. (2023). Gamification and Game-Based Learning as Cooperative Learning Tools: A Systematic Review. *International Journal of Emerging Technologies in Learning (IJET)*, *18*(21), 4–23. https://doi.org/10.3991/ijet.v18i21.40035.

Fuchs, K. (2022). Bringing Kahoot! Into the Classroom: The Perceived Usefulness and Perceived Engagement of Gamified Learning in Higher Education. *International Journal of Information and Education Technology*, *12*(7), 625–630. https://doi.org/10.18178/ijiet.2022.12.7.1662.

Ghaban, W., & Hendley, R. (2019). How Different Personalities Benefit from Gamification. *Interacting with Computers*, *31*(2), 138–153. https://doi.org/10.1093/iwc/iwz009.

Gupta, P., & Goyal, P. (2022). Is game-based pedagogy just a fad? A self-determination theory approach to gamification in higher education. *International Journal of Educational Management*, *36*(3), 341–356. https://doi.org/10.1108/IJEM-04-2021-0126.

Hazeline, A., Nurulwahida, A., Raja, H. R. M. A., Khairina, R., & Zaimah, A. (2021). Interactive Kahoot! - An Application to Enhance the Learning of Accounting Subject in School. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, *12*(3), 2305–2312. https://doi.org/10.17762/turcomat.v12i3.1210.

Huang, S., & Zhang, H. (2024). Gamification acceptance model towards online learning among college students: an empirical study based on mediation and moderation. *Asian Education and Development Studies*, *13*(2), 150–167. https://doi.org/10.1108/AEDS-11-2023-0152.

Idowu, A., Nat, M., & Kissi, P. S. (2020). Student perception of usefulness and ease using kahoot, a free web-based tool in a tertiary education setting. *Acta Scientiarum - Technology*, *43*, 1–12. https://doi.org/10.4025/actascitechnol.v43i1.47347.

Iqbal, M., Linda, Z. N. F., & Khin, T. W. (2023). THE INFLUENCE OF STUDENT ATTITUDES ON LEARNING ACHIEVEMENT. *Jurnal Ilmiah Ilmu Terapan Universitas Jambi*, *7*(2), 92–98.

Ismail, M. A.-A., & Mohammad, J. A.-M. (2017). Kahoot: A Promising Tool for Formative Assessment in Medical Education. *Education in Medicine Journal*, *9*(2), 19–26. https://doi.org/10.21315/eimj2017.9.2.2.

Ismail, M. E., Sa'Adan, N., Samsudin, M. A., Hamzah, N., Razali, N., & Mahazir, I. I. (2018). Implementation of the Gamification Concept Using KAHOOT! among TVET Students: An Observation. *Journal of Physics: Conference Series*, *1140*(1). https://doi.org/10.1088/1742-6596/1140/1/012013.

Kaddari, F., Ouahbi, I., & Darhmaoui, H. (2021). Gamification Approach in Teaching Web Programming Courses in PHP: Use of KAHOOT Application Ibrahim. *International Journal of Modern Education and Computer Science*, *13*(2), 33–39. https://doi.org/10.5815/ijmecs.2021.02.04.

Khairani, D. A., Sri, M., & Slamet, S. (2018). The effect of Gamification on Students. *The Effect of Gamification on Students' Motivation in Learning English*, *01*(April 2021), 160–164.

Kiyancicek, E., & Uzun, L. (2022). Gamification in English Language Classrooms: The Case of Kahoot! In *Science, Education, Art and Technology Journal (SEAT Journal)* (Vol. 6, Issue 1).

Krath, J., Schürmann, L., & von Korflesch, H. F. O. (2021). Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on

gamification, serious games and game-based learning. *Computers in Human Behavior*, *125*(January), 106963. https://doi.org/10.1016/j.chb.2021.106963.

Krejcie, R.V. and Morgan, D.W. (1970) Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30, 607-610.

Kwon, H. Y., & Özpolat, K. (2020). The Dark Side of Narrow Gamification : Negative Impact of Assessment Gamification on Student Perceptions and Content Knowledge. *INFORMS Transaction on Education*, *21(2)*(January), 67–81.

Licorish, S. A., & Lötter, A. L. J. (2022). When Does Kahoot! Provide Most Value for Classroom Dynamics, Engagement, and Motivation?: IS Students' and Lecturers' Perceptions. *Journal of Information Systems Education*, *33*(3), 245–260.

Lopes, A. P., Soler, M., Caña, R., Cortés, L., Bentabol, M., Bentabol, A., Muñoz, M. D. M., Esteban, A., & Luna, M. (2019). Gamification in Education and Active Methodologies at Higher Education. *EDULEARN19 Proceedings*, *1*, 1633–1640. https://doi.org/10.21125/edulearn.2019.0480.

López-Martínez, A., Meroño, L., Cánovas-López, M., García-de-Alcaraz, A., & Martínez-Aranda, L. M. (2022). Using Gamified Strategies in Higher Education: Relationship between Intrinsic Motivation and Contextual Variables. *Sustainability (Switzerland)*, *14*(17), 1–14. https://doi.org/10.3390/su141711014.

Neerupa, C., & William, A. J. (2024). Game on for learning : a holistic exploration of Gamification ' s impact on student engagement and academic performance in educational environments. *Management Matters*. https://doi.org/10.1108/MANM-01-2024-0001.

Neureiter, D., Klieser, E., Neumayer, B., Winkelmann, P., Urbas, R., & Kiesslich, T. (2020). Feasibility of kahoot! as a real-time assessment tool in (Histo-)pathology classroom teaching. *Advances in Medical Education and Practice*, *11*, 695–705. https://doi.org/10.2147/AMEP.S264821.

Nirwana, D., & Nur, I. A. (2023). An Analysis of Students' Perception Using Kahoot Game in Vocabulary Learning Process. *International Journal of Research on English Teaching and Applied Linguistics*, *4*(1), 1–11. https://doi.org/10.30863/ijretal.v4i1.5006.

Putu Ade Resmayania, N., & Nyoman Tri Darma Putrab, I. (2019). *Gamification: Using Kahoot! to Make Students Love the Class from the Very Beginning*. *7*, 2339–2940.

Raju, R., Bhat, S., Bhat, S., Souza, R. D', & Singh, A. B. (2021). Effective Usage of Gamification Techniques to Boost Student Engagement. In *Journal of Engineering Education Transformations* (Vol. 34).

Rojas-López, A., Rincón-Flores, E. G., Mena, J., García-Peñalvo, F. J., & Ramírez-Montoya, M. S. (2019). Engagement in the course of programming in higher education through the use of gamification. *Universal Access in the Information Society*, *18*(3), 583–597. https://doi.org/10.1007/s10209-019-00680-z.

Roll, I., Butler, D., Yee, N., Welsh, A., Perez, S., Briseno, A., Perkins, K., & Bonn, D. (2018). Understanding the impact of guiding inquiry: the relationship between directive support, student attributes, and transfer of knowledge, attitudes, and behaviours in inquiry learning. *Instructional Science*, *46*(1), 77–104. https://doi.org/10.1007/s11251-017-9437-x.

Santos-Villalba, M. J., Olivencia, J. J. L., Navas-Parejo, M. R., & Benítez-Márquez, M. D. (2020). Higher education students' assessments towards gamification and sustainability: A case study. *Sustainability (Switzerland)*, *12*(20), 1–20. https://doi.org/10.3390/su12208513.

Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human Computer Studies*, *74*(February 2015), 14–31. https://doi.org/10.1016/j.ijhcs.2014.09.006.

Sercanoglu, M., Bolat, Y. İ., & Goksu, İ. (2021). Kahoot! as a Gamification Tool in Vocational Education: More Positive Attitude, Motivation and Less Anxiety in EFL. *Journal of Computer and Education Research*, *9*(18), 682–701. https://doi.org/10.18009/jcer.924882.

Smiderle, R., Rigo, S. J., Marques, L. B., Peçanha de Miranda Coelho, J. A., & Jaques, P. A. (2020). The impact of gamification on students' learning, engagement and behavior based on their personality traits. *Smart Learning Environments*, *7*(1). https://doi.org/10.1186/s40561-019-0098-x.

Tamilarasu, R., & Parilah, M. S. (2020). Students perception on Gamification: The use of Kahoot. *International Journal of Scientific and Research Publications (IJSRP)*, *10*(05), 773–783. https://doi.org/10.29322/ijsrp.10.05.2020.p10190.

Tóth, Á., Lógó, P., & Lógó, E. (2019). The effect of the kahoot quiz on the student's results in the exam. *Periodica Polytechnica Social and Management Sciences*, *27*(2), 173–179. https://doi.org/10.3311/PPso.12464.

Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning – A literature review. *Computers and Education*, *149*. https://doi.org/10.1016/j.compedu.2020.103818.

Wirani, Y., Nabarian, T., & Romadhon, M. S. (2021). Evaluation of continued use on Kahoot! As a gamification-based learning platform from the perspective of Indonesia students. *Procedia Computer Science*, *197*, 545–556. https://doi.org/10.1016/j.procs.2021.12.172.

Yürük, N. (2020). Using Kahoot as a skill improvement technique in pronunciation. *Journal of Language and*

*Linguistic Studies*, *16*(1), 137–153. https://doi.org/10.17263/JLLS.712669.

Zaccone, M. C., & Pedrini, M. (2019). The effects of intrinsic and extrinsic motivation on students learning effectiveness. Exploring the moderating role of gender. *International Journal of Educational Management*, *33*(6), 1381–1394. https://doi.org/10.1108/IJEM-03-2019-0099.