

# THE INFLUENCE OF GAMIFICATION ON STUDENT MOTIVATION AND ACADEMIC ACHIEVEMENT: INSIGHTS FROM A PRE-EXPERIMENTAL STUDY

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**Abstract.** Educators continue to explore how to adapt to the needs of the technology and formulate learning curricula that can greatly affect learners' motivation to study among different learners' learning styles. However, there is a lack of research examining the relationship between gamification tools and their impact on academic performance and motivation across various learning styles, particularly in secondary education within international school settings. Therefore, this pre-experimental research aims to explore the learning style and motivation of secondary school students in international schools and the relationship between the integration of gamification tool in the classroom and academic performance. A total of 25 Year 7 secondary school students from the Mandarin Advance class of an international school in Johor Bahru were recruited to participate in this study. All of them were given the links to Google Forms to access the questionnaire, which included demographical questions, VAK Learning Styles, Motivation (ARCS) and Quizizz Preference Questionnaire. Wilcoxon and Kruskal-Wallis tests were applied to investigate the differences between the variables. The results revealed significant differences between students' academic performance and motivation element (Satisfaction) after using Quizizz. However, there is no significant difference in academic performance and motivation among different learning styles after using Quizizz. Research also found no relationship between motivation level and academic performance among different students' learning styles. However, students believe that Quizizz is very interesting and useful in learning, so schools and teachers can better use Quizizz to guide students in the classroom by understanding students' learning methods, thereby improving students' motivation to learn. Future researchers will be able to refer to the limitations and recommendations if they conduct similar research.

**Keywords:** *gamification, Quizizz, VAK, learning style, Chinese language*

## Introduction

Gamification is the use of game design components in non-game contexts to elicit desired behaviours and engage people (Raju et al., 2021). Many of us grew up playing games. Games play an important role in the informal and formal parts of our education in primary school (Nordstedt and Edvardsson, 2021). Unfortunately, in non-formal education, games are still often regarded as unhealthy activity, and the learning potential of games is often undiscovered. As educators, especially in recent years, children have relied on electronic devices, video games, films and multimedia since childhood. Games have attracted their interest in learning to a large extent in their lives. Therefore, gamification learning is becoming a new form of interactive content worth exploring. Gamification is a way to make learning fun for students by using game elements in non-game settings. It is a method of teaching that could solve difficulties with student

motivation and involvement (Mohamad et al., 2020). Some studies have pointed out that through technology-based learning methods, teaching effectiveness can be enhanced and students' interest and attention in the classroom can be increased (Razali et al., 2020). One of the research findings stated that there are significant differences in improving learning outcomes through gamification platforms (Wang et al., 2021). The results from the interviews revealed that students perceived gamified e-quizzes in a formative assessment context as fun, motivating, and engaging (emotional, cognitive, agentic, and behavioural engagement) compared to conventional paper-based quizzes, despite the fact that there were no significant differences in students' overall learning achievement scores between the paper-based quizzes and gamified e-quizzes (Zainuddin et al., 2020). The result shared similar findings that the gamification tool has significantly improved students' learning and achievement (Irwansyah and Izzati, 2021).

Besides the influence of gamification on learning outcomes, we should not ignore the learning style of learners. Learning style is a psychological, affective, and cognitive aspect that serves as a gauge for how people engage with and react to the learning environment (Zaric et al., 2018; Zapalska and Brozik, 2006). Numerous studies have suggested that learning style is one of the variables influencing students' academic success (Enjy et al., 2021; Bakri et al., 2019; Nabia and Ruhi, 2018). According to Bakri et al. (2019), it was discovered that students' speaking skills improved significantly because of employing the VAK learning style activity in the classroom. This was seen in the enhancement of the students' speaking abilities. The study of learning styles helps promote the learning process. However, there is a lack of research to determine the effectiveness of gamification for different learner styles.

## Materials and Methods

This pre-experimental research was conducted to explore the learning styles and motivation of secondary school students in international schools and the relationship between the integration of a gamification tool in the classroom and academic performance. The study recruited 25 Year 7 secondary school students from the Mandarin Advance class of an international school in Johor Bahru. The participants consisted of 25 Year 7 secondary school students from the Mandarin Advance class of an international school in Johor Bahru. They were given links to Google Forms to access the questionnaire, which included demographical questions, VAK Learning Styles, Motivation (ARCS), and Quizizz Preference Questionnaire. Wilcoxon and Kruskal-Wallis tests were applied to investigate the differences between the variables. The researcher conducted Chinese lessons over four weeks using Quizizz. Before the first week, participants took the Pre-Test to gather initial results, followed by the Motivation Pre-Test questionnaire and the VAK learning style questionnaire. Participants then engaged in three weeks of lessons using Quizizz as an intervention tool in their Chinese lessons. In Week 4, participants completed the Motivation Post-Test Questionnaire and the students' performance Post-Test. Additionally, they filled out the Quizizz Preference Questionnaire.

Quizizz provides comprehensive reports that offer insights into student performance and quiz analytics, as shown in *Figure 1*. These reports assist teachers to track progress, identify areas for improvement, and assess the effectiveness of their quizzes. There are five (5) research questions in this study: (1) Is there any difference in students'

motivation level and academic performances after using Quizizz? (2) Is there any difference in students' motivation level and academic performances among VAK learning style after using Quizizz? (3) Is there any relationship between students' motivation level and learning style after using Quizizz? (4) Is there any relationship between students' motivation level and learning style among VAK learning style after using Quizizz? (5) What is students' preference on gamification elements in Quizizz?

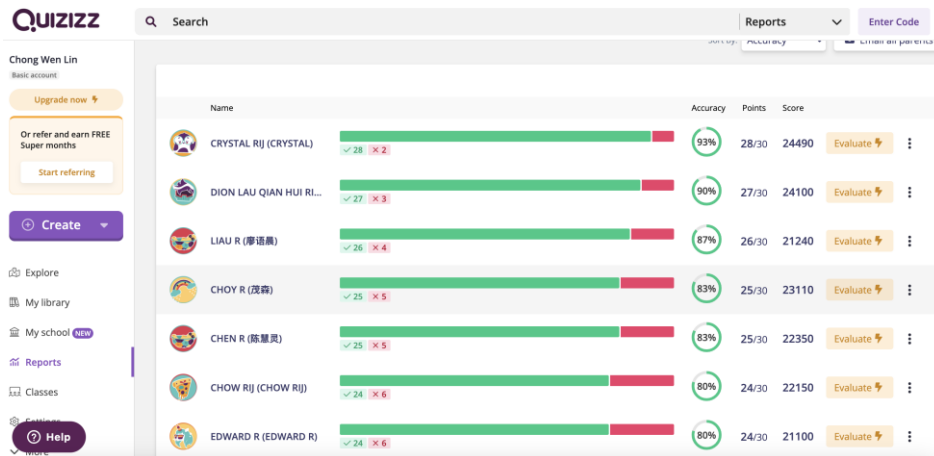


Figure 1. 'Reports' in Quizizz platform (Teachers' View).

## Results and Discussion

Before the introduction of the gamified learning, students were given a questionnaire to identify their learning style based on Visual, Auditory and Kinaesthetic (VAK) learning style. The details learning styles of each participant are being tabulated in the *Table 1*. Majority of the (13 students) are 'V' (visual) learners, most of them are female students (11 female students, 68.75%) and only 2 male students (22.22%) are Visual learner. The least learning style is 'K' (kinesthetic) learners, with only 1 male student and 3 female students. A normality test, Kolmogorov-Smirnov test, was ran through the data of academic performance of the participants. *Table 2* tabulated the results of the normality test for the pre and post test results of the participants. Based on above Kolmogorov-Smirnov and Shapiro-Wilk Sig normality test result, the p-values for both results were different, one less than 0.05, which is 0.001 for Pre-Test result, one is greater than 0.05, which is 0.114 for Post-Test result. As one of the p values is not normal distributed, so we can reject the null hypotheses. Hence, we will use non-parametric test to perform the data analysis. Data collected from the motivation questionnaire and performance test was used to address this objective. The respondents will need to answer two times which is before and after using Quizizz for their three Chinese lessons. The motivation questionnaire surveys were collected through Google Form while the performance test was collected using Quizizz.

Table 1. Learning Style (V,A,K) of Participants.

Learning style	Male	Female	Percentage (%)
V	2	11	52
A	6	2	32
K	1	3	16

Table 2. Results of normality test on pre and post test results.

Category	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
Pre-Test	.245	25	.000	.840	25	.001
Post-Test	.107	25	.200	.935	25	.114

### ***Analysis of the differences on pre-and post-test academic performance of participants***

The following hypotheses were formulated to address the research objective.

H0a<sub>1</sub>: There are no differences in students' performances before and after using Quizizz.

Among the 25 students, 16 of them get higher post-test scores than the pre-test test, which represents the progress of the students. The mean score of the students in post-test (23.56) is higher than the pre-test (21.64) score. Then, we employed the Wilcoxon signed-rank test to find the differences of overall pre and post test academic performance. Based on Pre-post test results (*Table 3*), the value is 0.034, which is smaller than 0.05, so we reject H0<sub>1a</sub> null hypothesis. For the overall academic performances of pre and post test, there is significant difference in students' performances before and after using Quizizz. This is similar to the research conducted by Wang et al. (2021), which found that Quizizz has a moderate to significant positive effect on learning outcomes. Previous study by Zhan et al. (2022) also demonstrated that gamification effectively boosts academic performance, and overall aptitude. In contrast, research done by Noor et al. (2022) shows a promising positive impact of gamification on students' engagement in learning Computer Programming subjects, however, there is no appreciable distinction between the experimental and control groups' academic achievement.

***Table 3. Results of Wilcoxon Signed ranks test between the pre and post test results.***

Category	Mean rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pre-post test results			-2.116b	0.034
Negative Rank	10.25	61.5		
Positive Rank	11.97	191.5		

### ***Analysis of differences on motivation level of participants***

The following hypotheses were formulated to address the research objective.

H0a<sub>2</sub>: There are no differences in students' motivation level before and after using Quizizz.

The details of student's motivation level collected from the motivation questionnaire survey before and after using Quizizz for their three Chinese lessons are being tabulated in the *Table 4*. According to *Table 4*, the post-test motivation level shows mean of relevance, confidence and satisfaction is higher than the mean of pre-test, which also means that students have improved their motivation to learn after using Quizizz as intervention learning tool. Mean of the students' motivation for Satisfaction in post-test is the highest mean compared to others. Then, we employed the Wilcoxon signed-rank test to find the differences of overall motivation level. Based on results *Table 5*, the p value of 'Attention' is 0.273, 'Relevance' is 0.405 and 'Confidence' is 0.644. These 3 motivation items p value are larger than 0.05, so the results is not significant differences, we can conclude that we failed to reject the null hypothesis. There are no

differences in students' motivation level before and after using Quizizz. However, we can see the 'Satisfaction' p value is smaller than 0.05, which is 0.037, it means there is differences in 'Satisfaction' of motivation level before and after using Quizizz. We can conclude that statistical analysis using the Wilcoxon signed-rank test led to the rejection of the  $H_{0a2}$  null hypotheses. In contrast, Jagust et al. (2017) discovered that gamified learning positively influenced the motivation of primary learners, based on the analysis of log data recorded during the research. Research done by Othman et al. (2024) also found that a positive correlation between the implementation of their gamified science activity called CHEM-XPLORACE, and heightened student enjoyment and motivation in learning science, particularly Chemistry. Moreover, students reported an enhancement in their ability to retain scientific facts and knowledge, attributed to their engagement in the gamified activities. However, they did not specify which elements of motivation were impacted by the intervention. Nonetheless, continuous learning through gamification, as used in this study with Quizizz, may help students maintain their concentration for longer periods, enabling them to complete more tasks.

**Table 4.** Descriptive table for all items under construct motivation.

Category	Mean		Std. Deviation	
	Pre	Post	Pre	Post
Motivation (Attention)	3.28	3.08	0.791	0.493
Motivation (Relevance)	3.40	3.52	0.816	0.770
Motivation (Confidence)	3.40	3.48	0.866	0.653
Motivation (Satisfaction)	3.64	4.08	0.952	0.702

**Table 5.** Results of Wilcoxon signed ranks test between the each motivation items.

Category		Mean rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
[Attention] Post-Test - Pre-Test	Negative Rank	5.25	31.5	-1.095	0.273
	Positive Rank	4.5	13.5		
[Relevance] Post-Test - Pre-Test	Negative Rank	5.00	20.0	-.832	0.405
	Positive Rank	5.83	35.00		
[Confidence] Post-Test - Pre-Test	Negative Rank	6.70	33.50	-.462	0.644
	Positive Rank	6.36	44.50		
[Satisfaction] Post-Test - Pre-Test	Negative Rank	10.25	41.00	-2.082	0.037
	Positive Rank	9.29	130.00		

### ***Difference in students' motivation level and academic performance among VAK learning style after using Quizizz***

Data collected from the same motivation questionnaire and performance test was used to address this objective. However, this time we group each data into three (3) different categories of Visual, Kinaesthetic and Auditory (VAK) learning style.

### ***Analysis of differences among VAK learning style on academic performance of participants***

The following hypotheses were formulated to address the research objective.

$H_{0b1}$ : There are no differences in students' academic performance among VAK learning style before and after using Quizizz.

The Kruskal-Wallis's test was conducted to examine the relationship between learning styles (visual, auditory, and kinaesthetic) and the pre and post-performance results. As shown in Table 6, the sample consisted of 13 visual learners, 8 auditory learners, and 4 kinaesthetic learners. Based on the analysis results showed in Table 7,

the p value is greater than 0.05. it indicates that there is no significant difference among the pre-and post-performance results of visual, auditory, and kinaesthetic learners. So, we fail to reject the  $H_{0b_1}$  null hypothesis, suggesting that there is no evidence to support the claim that the learning style has an impact on academic performance outcomes after using Quizizz. Similarly, Cimermanová (2018) found that the academic performance of students with different learning styles does not significantly differ based on their learning style. Learning style influences how students learn, how teachers teach, and the interaction between the two. While everyone is inclined toward a specific style due to biological or genetic traits, these characteristics are also shaped by culture, personal experiences, maturity, and development (Vaishnav and Chirayu, 2013). In contrast, a study by Vaishnav and Chirayu (2013) found that different learning styles significantly impact students' academic achievement. Additionally, research by Chetty et al. (2019) identified a significant relationship between learning styles and teaching styles, which can influence students' academic performance.

**Table 6.** Results of Kruskal-Wallis Test between the learning style and pre and post performance results.

Learning style	N	Mean rank
V	13	13.85
A	8	12.31
K	4	11.63

**Table 7.** Results of Kruskal-Wallis Test between the pre and post test results and motivation level among VAK learning style group.

Category	Different test
Kruskal-Wallis	0.384
df	2
Asymp. Sig.	0.825

### **Analysis of differences among VAK learning style on motivation level of participants**

The following hypotheses were formulated to address the research objective.

$H_{0b_2}$ : There are no differences in students' motivation level among VAK learning style before and after using Quizizz.

Table 8, tabulate the mean rank for each component of motivation (Attention, Relevance, Confidence and Satisfaction) among the visual, auditory, and kinaesthetic learners. It shows that mean rank for Auditory groups is the highest for all components of motivation (Attention, Relevance, Confidence and Satisfaction). However, based on the analysis results showed in Table 9, the p value of all components of motivation (Attention, Relevance, Confidence and Satisfaction) is greater than 0.05, so there is no significant differences between students' learning style and their motivational level after using Quizizz. So, we fail to reject the null hypothesis, suggesting that there is no evidence to support the claim that the learning style has an impact on performance outcomes. Srichanyachon (2012) also found no statistically significant differences in students' learning styles and learning motivation. Similarly, Findley (2011) reported no significant difference between students' learning styles and the motivation experienced during the educational process. Contrary findings exist, such as a study by Sengodan and Iksan (2012), which found a significant relationship between hard work learning styles and intrinsic motivation. Ghaedi and Jam (2014) also identified a significant

relationship between learning styles and motivation for higher education. Additionally, research by Chik and Abdullah (2018) showed that motivation, learning style, and learning discipline positively and significantly impact students' academic performance.

**Table 8.** Results of Kruskal-Wallis Test between the learning style and motivation post test results.

Learning style	N	Mean rank			
		Attention	Relevance	Confidence	Satisfaction
V	13	12.50	11.50	10.54	11.38
A	8	14.06	16.63	16.88	16.00
K	4	12.50	10.63	13.25	12.25

**Table 9.** Results of Kruskal-Wallis Test on motivation post test results among VAK learning style group.

Category	Post-Test (Attention)	Post-Test (Relevance)	Post-Test (Confidence)	Post-Test (Satisfaction)
Kruskal-Wallis	0.769	3.507	4.565	2.404
df	2	2	2	2
Asymp. Sig.	0.681	0.173	0.102	0.301

### The relationship between motivation level and academic performance among students

The following hypotheses were formulated to address the research objective.

H0c<sub>1</sub>: There is no relationship between students' motivation level and academic performance before and after using Quizizz.

Spearman correlation test is used to analyse the relationship between motivation level and academic performances of the participants. The academic performances of participants are still based on the Pre-Test and Post-Test results. The results of Spearman correlate test are tabulated in Table 10. The results in Table 10 shows no correlation between achievement and motivation (>0.05). But there is a link between Attention and Relevance, Attention and Confidence, Confidence and Satisfaction, and Relevance and Satisfaction (<0.05). However, since there no significant correlation for the achievement and motivation components of the ARCS (> 0.05), its means we fail to reject the null hypothesis, suggesting that there is no evidence to support the claim that the motivation has a correlation with academic performance.

**Table 10.** Results of Spearman's rho Correlation Test between the pre and post test results and each motivation items level.

Category	Different Test	Post-Test (Attention) Mean	Post-Test (Relevance) Mean	Post-Test (Confidence) Mean	Post-Test (Satisfaction) Mean
Different Test	Correlation Coefficient	0.154	-0.138	-0.206	-0.134
Post-Test (Attention) Mean	Sig. (2 tailed)	0.462	0.511	0.323	0.524
	Correlation Coefficient	0.154	0.508	0.542	0.168
Post-Test (Relevance) Mean	Sig. (2 tailed)	0.462	0.010	0.005	0.422
	Correlation Coefficient	-0.138	0.508	0.347	0.622
Post-Test (Confidence) Mean	Sig. (2 tailed)	0.511	0.010	0.089	<.001
	Correlation Coefficient	-0.206	0.542	0.347	0.576
Post-Test (Satisfaction) Mean	Sig. (2 tailed)	0.323	0.005	0.089	0.003
	Correlation Coefficient	-0.134	0.168	0.622	0.576
	Sig. (2 tailed)	0.524	0.422	<.001	0.003

Note: \*\*Correlation is significant at the 0.01 level (2-tailed).

***The relationship between motivation level and academic performance relationship between students' motivation level and academic performance among VAK learning style***

The following hypotheses were formulated to address the research objective.

H0d<sub>1</sub>: There is no relationship between students' motivation level and academic performance among VAK learning style before and after using Quizizz.

The research question of the current study indented to see if there was any significant relationship between motivation level and academic performances among different learning style after using Quizizz. A correlation coefficient close to -1 or 1 suggests a strong relationship, while values closer to 0 indicate a weaker relationship. A Spearman correlation was run to investigate the correlation between mentioned variables. *Table 11* reports the results. Based on the results show in *Table 11*, the p-value associated with the correlation coefficient is used to determine if the observed correlation is statistically significant. Therefore, based on the results on *Table 11*, the p-value of all the motivation components for Visual and Kinaesthetic learners are greater than 0.05, so we can conclude that there is no significant relationship between motivation level and academic performance among this two (2) learning style category of participants. However, for Auditory learners, the motivation on satisfaction component shows a significant value (p<0.05). This means, there is a relationship between the variables. A negative value indicates a negative correlation (as one variable increases, the other tends to decrease). So, we can conclude that the Overall Motivation Post-Test Mean of Auditory learners show a strong negative correlation which the value is -0.854. In this study, most participants are visual learners, and the results indicate that visual learners have higher classroom participation than auditory and kinesthetic learners. Furthermore, elements of student motivation (achievement, recognition, relationship with peers, and relationship with lecturers) significantly mediate the relationship between learning style and student participation (Halif et al., 2020). Previous study by Irwansyah and Izzati (2021) also found that students using Quizizz for learning English demonstrated a positive attitude toward the assessments. Quizizz offers engaging features that make learning and evaluation enjoyable for students.

***Table 11. Results of Spearman correlations motivation vs performance between learning style categories.***

Category			(Attention)	(Relevance)	(Confidence)	(Satisfaction)
V	Different Test	Correlation	0.143	0.239	0.079	0.265
	N (13)	Sig. (2 tailed)	0.640	0.431	0.798	0.382
A	Different Test	Correlation	0.154	-.668	-.426	-.854
	N (8)	Sig. (2 tailed)	0.715	0.070	0.293	0.007
K	Different Test	Correlation	0.00	0.827	-.130	0.921
	N (4)	Sig. (2 tailed)	0.00	0.173	0.870	0.079

***Students' preference on gamification elements in Quizizz***

In order to address this research objective, the gamification preference instrument was used to collect data how students feel about it. The question was given to each student based on what they thought and felt. The participant answered Quizizz preference questionnaire with the 5-point Likert scale. The results for the average mean

of each question are shown in *Table 12*. The highest means on Quizizz preference questionnaire shown in *Table 12* is the statement of “Quizizz is interesting and fun” and “Quizizz is better than the traditional test”. Both have 4.44 average means among other questions. For the first statement “How would you rate the [Quizizz] apps?” average mean value is 4.28 which is between agree and strongly agree. It means that more of the students think Quizizz is good to use and they satisfied about Quizizz. The lowest mean is 3.4 with the statement of ‘Quizizz doesn’t make me tense in doing the test’. The findings of this analysis indicate that students will not experience anxiety or fear when utilizing Quizizz to respond, and that their feelings are good. Based on results shown in *Table 13*, the highest mean is 5.0 which is the Auditory learners think that ‘Quizizz is interesting and fun.’ The highest mean of Visual learners is the statement ‘Quizizz is better than the traditional test.’ which has 4.5 average mean. The lowest mean is 3.1 with the statement ‘I can’t cheat during the test using Quizizz.’ The rating of Quizizz of V, A, K learners are 4.2, 4.6 and 4.0, which have a higher average, it means that all learners with different learning styles believe that Quizizz is a platform that is conducive to their use in the learning process. The highest means for Kinaesthetic learners is 4.3, it has 3 different statements, which are ‘I enjoyed using Quizizz in my learning’, ‘I felt motivated to answer the questions when using Quizizz’ and ‘The point I earned motivated me to study more’. In summary, these three statements are all about students' positive feedback on Quizizz after using Quizizz, which also motivates them to improve their motivation for learning and is very suitable for use in learning.

**Table 12.** *The average mean of Quizizz preference questionnaire of each statement.*

Items	Statement	Average mean
A1	How would you rate the [Quizizz] apps?	4.28
B1	I enjoyed using Quizizz in my learning.	4.4
B2	I felt motivated to answer the questions when using Quizizz.	4.12
B3	Quizizz is interesting and fun.	4.44
B4	Quizizz has many challenging features.	4.08
B5	Quizizz doesn't make me tense in doing the test.	3.4
B6	I feel encouraged to be number one on the leader board.	4
B7	The point I earned motivated me to study more.	3.96
B8	Quizizz feels like a game.	4.24
B9	I can't cheat during the test using Quizizz.	3.64

**Table 13.** *The average mean of Quizizz preference questionnaire of each statement among different learning style category.*

Items	Statement	Mean V	Mean A	Mean K
A1	How would you rate the [Quizizz] apps?	4.2	4.6	4.0
B1	I enjoyed using Quizizz in my learning.	4.4	4.5	4.3
B2	I felt motivated to answer the questions when using Quizizz.	3.8	4.5	4.3
B3	Quizizz is interesting and fun.	4.2	5.0	4.0
B4	Quizizz has many challenging features.	3.7	4.9	3.8
B5	Quizizz doesn't make me tense in doing the test.	3.2	3.8	3.3
B6	I feel encouraged to be number one on the leader board.	3.7	4.5	4.0
B7	The point I earned motivated me to study more.	3.8	4.0	4.3
B8	Quizizz feels like a game.	4.2	4.5	4.0
B9	I can't cheat during the test using Quizizz.	3.1	4.4	4.0
B10	Quizizz is better than the traditional test.	4.5	4.8	3.8

According to Aldalur and Perez (2023), students believe that the games make the learning environment fun and engaging, and it also makes them feel motivated to attend in class. They also said that answering the questions well makes them increase their own confidence and that gamification is not intimidating. The researcher has noticed that Quizizz is among popular digital tools for language learning in recent years. It appears that students are more interested and actively participate in the lessons when we

instructors incorporate this application into the curriculum. On the online quiz platform Quizizz, students compete with one another to score the most points (Degirmenci, 2021). Gamification is an effective method for influencing the behavior and learning attitudes of pupils in order to increase their motivation and participation. Changes can have an impact on students' performance and comprehension of educational material, as well as establish the conditions for an effective learning process (Kiryakova et al., 2014). It can be concluded that students are more motivated in class when they are having fun and experiencing positive emotions, which causes them to pay greater attention. They anticipate using this strategy for other subjects as well (Aldalur and Perez, 2023). Consequently, Quizizz also supports teachers and students in becoming more innovative in teaching, learning, and assessment processes. Additionally, students unanimously agree that Quizizz provides a visually appealing and engaging interface. It prevents cheating during exams, promotes competition in the classroom, and is considered superior to traditional offline assessments (Amalia, 2020).

## **Conclusion**

This study explored the connections between gamification, learning styles, and motivation among secondary school students, with a particular focus on the use of Quizizz. The findings revealed that Quizizz significantly enhanced students' satisfaction and academic performance, but it did not result in significant differences across various learning styles. This suggests that while Quizizz is effective in boosting overall student motivation and performance, its impact may be more universal, rather than tailored to specific learning styles. Critically, these results challenge the assumption that instructional tools need to be customized for different learning styles to be effective. Instead, the data implies that well-designed gamification tools like Quizizz can transcend these differences, providing a broadly engaging and motivating experience for all students. This raises important questions about the necessity of differentiating instruction based on learning styles when using gamified platforms, a topic that warrants further investigation. Moreover, while the study confirms the benefits of Quizizz in terms of student engagement and satisfaction, it also highlights a potential limitation: the lack of differentiation in outcomes across learning styles. Future research should investigate whether other gamification tools or different pedagogical approaches can better cater to individual learning preferences, thereby maximizing the educational benefits for all students. However, it is crucial for educators to remain critical of the tools they adopt, ensuring that they not only engage students but also meet diverse learning needs effectively. In conclusion, Quizizz is a highly useful platform that is widely enjoyed by students. Its gamification learning approach, accessibility, collaboration features, progress tracking, engaging visuals, and integration with learning management systems make it a valuable tool for student engagement and learning. With its interactive and enjoyable format, Quizizz has gained popularity among students and has proven to be an effective resource for enhancing educational experiences.

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## Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

## REFERENCES

- [1] Aldalur, I., Perez, A. (2023).: Gamification and discovery learning: Motivating and involving students in the learning process. – *Heliyon* 9(1): 14p.
- [2] Amalia, D.F. (2020): Quizizz website as an online assessment for English teaching and learning: Students' perspectives. – *Jo-ELT (Journal of English Language Teaching) Fakultas Pendidikan Bahasa & Seni Prodi Pendidikan Bahasa Inggris IKIP* 7(1): 1-8.
- [3] Bakri, R.A., Rahman, M.A., Jabu, B. (2019): Exploring the Impact of VAK Learning Style on Teenager Level Language Learners in Indonesia. – *Journal of Language Teaching and Research* 10(4): 807-814.
- [4] Chetty, N.D.S., Handayani, L., Sahabudin, N.A., Ali, Z., Hamzah, N., Rahman, N.S.A., Kasim, S. (2019): Learning Styles and Teaching Styles Determine Students' Academic Performances. – *International Journal of Evaluation and Research in Education* 8(4): 610-615.
- [5] Chik, Z., Abdullah, A.H. (2018): Effect of motivation, learning style and discipline learn about academic achievement additional mathematics. – *International Journal of Academic Research in Business and Social Sciences* 8(4): 772-787.
- [6] Cimermanová, I. (2018): The Effect of Learning Styles on Academic Achievement in Different Forms of Teaching. – *International Journal of Instruction* 11(3): 219-232.
- [7] Degirmenci, R. (2021): The Use of Quizizz in Language Learning and Teaching from the Teachers' and Students' Perspectives: A Literature Review. – *Language Education and Technology* 1(1): 1-11.
- [8] Enjy, A., Sally, F., Nourhan, F.W., Rania, A., Mohamed, H., Doaa, K. (2021): Influence of Personality Traits and Learning Styles on Undergraduate Medical Students' Academic Achievement. – *Advances in Medical Education and Practice* 12: 769-777.
- [9] Findley, M.R. (2011): The relationship between student learning styles and motivation during educational video game play. – *International Journal of Online Pedagogy and Course Design (IJOPCD)* 1(3): 63-73.
- [10] Ghaedi, Z., Jam, B. (2014): Relationship between Learning Styles and Motivation for Higher Education in EFL Students. – *Theory & Practice in Language Studies* 4(6): 1232-1237.
- [11] Halif, M.M., Hassan, N., Sumardi, N.A., Omar, A.S., Ali, S., Aziz, R.A., Majid, A.A., Salleh, N.F. (2020): Moderating Effects of Student Motivation on the Relationship between Learning Styles and Student Engagement. – *Asian Journal of University Education* 16(2): 94-103.
- [12] Irwansyah, R., Izzati, M. (2021): Implementing Quizizz as Game Based Learning and Assessment in the English Classroom. – *TEFLA Journal (Teaching English as Foreign Language and Applied Linguistic Journal)* 3(1): 13-18.
- [13] Jagust, T., Boticki, I., Mornar, V., So, H.J. (2017): Gamified Digital Math Lessons for Lower Primary School Students. – In *IIAI International Congress on Advanced Applied Informatics* 4p.
- [14] Kiryakova, G., Angelova, N., Yordanova, L. (2014): Gamification in education. – In *Proceedings of 9th International Balkan Education and Science Conference* 1: 679-684.
- [15] Mohamad, M., Arif, F.K.M., Alias, B.S., Yunus, M.M. (2020): Online game-based formative assessment: Distant learners post graduate students' challenges towards Quizizz. – *International Journal of Scientific and Technology Research* 9(4): 994-1000.

- [16] Nabia, L.S., Ruhi, K. (2018): The relationship between Personality Traits, Learning Styles and Academic Performance of E-Learners. – *Open Praxis* 10(3): 249-263.
- [17] Noor, N.M., Abd Razak, A., Din, H.M., Palaniappan, K. (2022): Gamification's effect on learning and engagement in programming course among non-major computer science students. – *Sains Humanika* 14(3-2): 37-43.
- [18] Nordstedt, M., Edvardsson, O. (2021): Investigating gamification's effect on student motivation when authoring questions. – *KTH Royal Institute of Technology* 44p.
- [19] Othman, M.I., Husin, N.I., Abdullah, A.R., Bakhari, N.A., Zin, A.M., Mokhtar, M. (2024): A Journey into the Thrilling Depths of Chemistry Through Gamification. – *Quantum Journal of Social Sciences and Humanities* 5(2): 104-110.
- [20] Raju, R., Bhat, S., Bhat, S., D'Souza, R., Singh, A. B. (2021): Effective usage of gamification techniques to boost student engagement. – *Journal of Engineering Education Transformations* 34: 713-717.
- [21] Razali, N., Nasir, N.A., Ismail, M.E., Sari, N.M., Salleh, K.M. (2020): Gamification elements in Quizizz applications: Evaluating the impact on intrinsic and extrinsic student's motivation. – In *IOP Conference Series: Materials Science and Engineering*, IOP Publishing 917(1): 10p.
- [22] Sengodan, V., Iksan, Z.H. (2012): Students' learning styles and intrinsic motivation in learning mathematics. – *Asian Social Science* 8(16): 17-23.
- [23] Srichanyachon, N. (2012): The relationships of learning styles, learning motivation and academic success in EFL learning context. – *Mediterranean Journal of Social Sciences* 3(3): 211-216.
- [24] Vaishnav, R.S., Chirayu, K.C. (2013): Learning style and academic achievement of secondary school students. – *Voice of Research* 1(4): 1-4.
- [25] Wang, Y., Qiao, Y., Wang, X. (2021): Effects of Gamified Learning Platforms on Students' Learning Outcomes: A Meta-analysis Taking Kahoot and Quizizz as Examples. – In *2021 13th International Conference on Education Technology and Computers* 6p.
- [26] Zainuddin, Z., Shujahat, M., Haruna, H., Chu, S.K.W. (2020): The role of gamified e-quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system. – *Computers & Education* 145: 15p.
- [27] Zapalska, A., Brozik, D. (2006): Learning styles and online education. – *Campus-Wide Information Systems* 23(5): 325-335.
- [28] Zaric, N., Scepanovic, S., Schroeder, U. (2018): Learning Style Gamification Model: Gamification in E-Learning Based on Students' learning Styles. – *ICERI2018 Proceedings* 9p.
- [29] Zhan, Z., He, L., Tong, Y., Liang, X., Guo, S., Lan, X. (2022): The effectiveness of gamification in programming education: Evidence from a meta-analysis. – *Computers and Education: Artificial Intelligence* 11p.