

Research Article

Gamification in zoology teaching and learning

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Abstract: Traditional methods in teaching and learning can reduce students' attention. Interaction through gamification is believed to balance the challenges. The objectives of this project are to develop zoology-based gamification and evaluate its effectiveness in encouraging students' interest in learning zoology. Canva is used for the diagram preparation while Liveworksheets drag, and drop are used for the gamification development. A set of questionnaires was developed using Google Form to determine the effectiveness of gamification. Gamification link together with QR Code and questionnaires were distributed to 27 undergraduate students in biology. All students (100%) agreed that gamification is the latest method which is interesting and can help in the teaching and learning process. All students (100%) are also willing to use gamification methods in the teaching and learning process. The conclusion of this project is that gamification is a very good, effective, and entertaining learning tool in zoology.

Keywords: Gamification; education; zoology.



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1. INTRODUCTION

Gamification is the process of integrating game dynamics, mechanisms, and frameworks into environments that are not gaming-related (Stott & Neustaedter, 2013). Gamification practices adopted to support learning processes enacted in the education and professional training sectors is a rapidly growing phenomenon. It has been put out in educational settings to enhance student performance,

engagement, and satisfaction (Ahmad *et al.*, 2020). Although gamification methods have gain attention of educators, zoological gamification still has rooms to explore. Therefore, the objectives of this project are to develop zoology-based gamification and evaluate the effectiveness of gamification in encouraging students to learn zoology in an interactive and fun ways.

2. MATERIAL & METHOD

The design of the gamification is based on Kim (2015). The questions related to zoology syllabus were collected from established sources such as books, website, and others. The game layout was designed using Canva application, then it was converted to pdf format. The pdf files have been uploaded into Liveworksheets to develop a drag and drop gamification. The link and QR Code to Liveworksheets shown in Table 1.

Table 1. Link and QR Code to Liveworksheets zoological gamification.

Liveworksheets link	QR Code
Introduction of animal (Set 1) : https://www.liveworksheets.com/cs3367907nl	
Introduction of animal 2 (Set 2): https://www.liveworksheets.com/7-bc259654er	
Invertebrates (Set 3): https://www.liveworksheets.com/7-ni259667dr	
Invertebrates 2 (Set 4) : https://www.liveworksheets.com/hj3367895yk	

continue...

Chordates (Set 5): <https://www.liveworksheets.com/7-hp259674mu>



A total of 27 first semester students in biological courses have responded to the questionnaires on the effectiveness of zoological gamification in teaching and learning. The results of the questionnaires were obtained directly from the Google Forms.

3. FINDINGS

3.1 DEVELOPMENT OF GAMIFICATION

This project has successfully developed the zoological gamification for teaching and learning process (Figure 1).

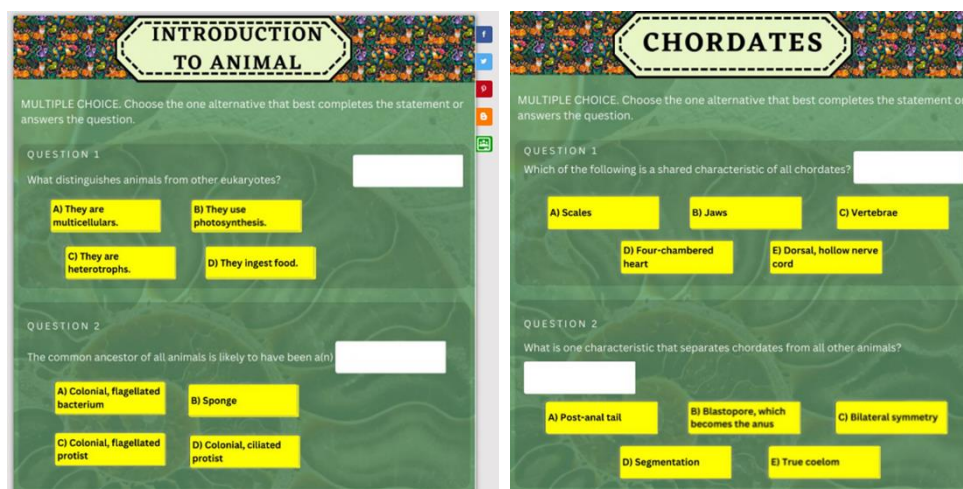


Figure 1. Sample of the development of zoological gamification using Liveworksheets.

3.2 EFFECTIVENESS OF GAMIFICATION

A total of 27 students (100%) agreed that gamification is the useful method which is interesting and can help in the teaching and learning process (Figure 2a) and all respondents (100%) also are willing to continue using the gamification method in their learning process (Figure 2b).

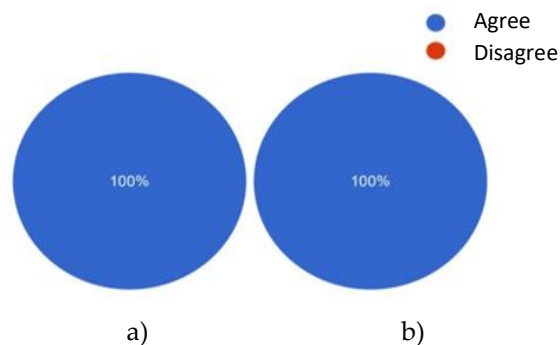


Figure 2. Students' response to the zoological gamification in teaching and learning: a) interesting and helpful, and b) continue gamification method.

Students also have responded mainly agree and followed by strongly agree that gamification is an interactive platform, can achieve the learning outcome, an attractive method, help in cognitive and psychomotor learning domain, an effective learning strategy and improve critical thinking (Table 2).

Table 2. Response to the effectiveness of zoological gamification in teaching and learning.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Interactive platform	0	0	59.3	40.7
Achieve the learning outcome	0	0	55.6	44.4
Attractive method	0	0	51.9	48.1
Helps in the cognitive domain and psychomotor	0	0	63	37
Achieving interactive and effective learning strategies	0	0	66.7	33.3
Improve critical thinking	0	0	59.3	40.7

4. DISCUSSION

This study showed responses mainly agree (59.3%) and strongly agree (40.7%) that gamification methods help in achieving the learning outcome and it is also an interactive method which can motivate students in the learning process for zoological studies (Table 2). This finding also in line with Sailer *et al.* (2013) and Yapici & Karakoyun (2017) that gamification stimulates cognitive creativity (intelligence) and psychomotor in the learning process, particularly in zoology. Gamification methods that involve a time restriction function can boost a student's critical thinking by requiring them to make quick and correct selections.

A total of 55.6% and 44.4%, respectively agree and strongly agree that gamification can achieve the learning outcome. This finding agreed with Eschenbrenner, Nah & Siau (2008) that educational institutions are interested in gamification of education, where educators create gamified learning environments to enhance learner engagement and improve learning outcomes.

A total of 51.9% and 48.1% respectively agree and strongly agree that gamification is an interesting method in teaching and learning. Game design elements such as storytelling and feedback is important and also can be included in the gamification. Storytelling refers to the narrative of the game which can be used to sustain learners' interest and engagement. Kapp (2012) indicated that gamification can increase learner engagement in the learning process.

A total of 63% and 37%, respectively agree and strongly agree that gamification helps in the cognitive and psychomotor, learning domain. The frequency, intensity, and immediacy of feedback from gamification are helpful for learner engagement. The more frequent and immediate the feedback is, the greater the learning effectiveness and learner engagement. Clear and immediate feedback has been shown to be important for attaining the flow state, which is a state of engagement and immersion in an activity (Csikszentmihalyi, 1997).

A total of 66.7% and 33.3% respectively agree and strongly agree that gamification is a good interactive platform for teaching and learning in zoology. Learning is fun and it feels like gaming but not playing. Therefore, using adaptive learning strategies with gamification makes students have fun and at the same time, learn the lesson. Furthermore, using this method can help students to improve learning engagement, suit students' learning style, and provide more adaptive learning. Adaptive learning strategies with gamifications need to be applied in teaching and learning activities to enhance student engagement (Siti Nurul Mahfuzah *et al.*, 2019).

A total of 59.3% and 40.7% respectively agree and strongly agree that gamification can improved critical thinking. This finding in line with López Carrillo *et al.* (2019) that the students were attracted by the motivational and aesthetic part of the game and within it by the part where they had to think critically, work in groups or cooperate with other students.

5. CONCLUSION

Gamification is a powerful tool in facilitating the teaching and learning process in zoology. This project has successfully developed gamification through Liveworksheets. The students have responded that this zoological gamification in teaching and learning is very good, effective and can be continued. For future planning, the zoological gamification can be improved and added with more advanced features in the fully paid version of Liveworksheets.

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