

Gamifying Learning with EduBuzz: A Study on Its Effectiveness in Form 5 Chemistry Classrooms

Theresa a/p Stanley Lourdes Benedict
(SMK Bandar Tun Hussein Onn 2, Malaysia)

ABSTRACT

Gamification in education has emerged as a potent method for improving student engagement, motivation, and learning results. This research investigates the influence of EduBuzz, an interactive response system, on student engagement and academic achievement in Form 5 Chemistry classes. EduBuzz amalgamates technology with gamified components, enabling students to answer questions via designated buzzers, while the teacher's monitor captures and exhibits the swiftest responses. The research was carried out during a revision lesson with 30 Form 5 Chemistry students, who offered feedback via electronic devices post-session. Data study indicated that 95% of students reported heightened engagement, whilst 90% concurred that EduBuzz facilitated equitable participation. Educators observed a notable enhancement in classroom management, as EduBuzz automated student selection, hence conserving instructional time. Furthermore, students exhibited increased motivation and accelerated response times, which enhanced the memory of essential Chemistry ideas. Notwithstanding its advantages, small technical issues were observed, suggesting the necessity for additional improvement. This study emphasizes EduBuzz's potential as a sustainable and innovative educational instrument, in accordance with SDG 4: Quality Education, by promoting an inclusive, dynamic, and technology-enhanced learning environment. Future studies ought to investigate its application across various subjects and educational levels.

KEYWORDS - Gamification, EduBuzz, Classroom Engagement, Student Participation, Interactive Learning, Sustainable Development Goal 4.

1. INTRODUCTION

Classroom engagement continues to pose a significant difficulty in education, especially in subjects such as Chemistry, where students frequently refrain from participating due to fear of error, lack of self-confidence, or perceived favoritism in teacher assessment [1,2]. Conventional student selection procedures might result in unequal involvement, with certain students monopolizing discussions while others remain passive, hindering teachers' efforts to foster an inclusive and participatory learning environment [3]. Prior research has investigated gamification as a method to augment student engagement, with tools such as Kahoot! and Socrative demonstrating favorable outcomes in boosting participation and motivation [4,5]. Nonetheless, these technologies frequently rely on internet connectivity and may inadequately facilitate real-time response selection in face-to-face classroom settings [6]. This study presents EduBuzz, an interactive answering system aimed at automating student response selection to promote fairness, efficiency, and enhanced engagement. EduBuzz enables students to activate designated buzzers for immediate responses, with the teacher's monitor showcasing the initial recorded reply, eliminating bias and manual selection [7]. This study evaluates the efficacy of EduBuzz in a Form 5 Chemistry revision class, concentrating on its influence on student motivation, equity, and classroom management effectiveness. By offering empirical evidence of its effectiveness, EduBuzz addresses the limitations of existing tools and aligns with Sustainable Development Goal 4 (SDG 4: Quality Education) by promoting inclusive and equitable learning opportunities [8].

2. EDUBUZZ



3. METHODOLOGY

The study employed a quantitative research methodology to evaluate the effectiveness of EduBuzz in enhancing student engagement, fairness, and classroom management in a Form 5 Chemistry revision class. A pre-test and post-test approach was utilized to assess student participation before and after implementing EduBuzz, and student perceptions were gathered through a standardized feedback survey [1,2]. The research involved 30 Form 5 Chemistry students from SMK Bandar Tun Hussein Onn 2, who engaged in a structured revision session facilitated by their teacher. Initially, a 20-minute traditional Q&A session was conducted where students responded by raising their hands, and their engagement and response times were recorded. During the EduBuzz implementation, students were assigned numbered buzzers to answer questions, with the teacher's monitor displaying the first response received. Data collection after the session revealed an increase in student participation, and response times were analyzed [3]. Following the activity, students provided feedback via an online survey using their electronic devices, with the survey incorporating Likert-scale and open-ended questions about engagement, fairness, and motivation [4]. Data analysis compared participation rates and response times before and after using EduBuzz, while survey responses were categorized into engagement, fairness, and classroom management efficiency, with statistical evaluation of Likert-scale responses [5]. Ethical considerations ensured voluntary participation, anonymity, and adherence to classroom-based research guidelines, with no personal information collected. The application of interactive technologies in education, such as EduBuzz, follows a similar analytical approach to other technology-driven learning tools, as seen in previous studies on gamification, student engagement, and digital learning platforms [6,7].

4. DISCUSSION

The results demonstrate that EduBuzz markedly improves student engagement, equity, and time efficiency in classroom interactions. In the conventional Q&A session, only 50% of students engaged, however with EduBuzz, participation surged to 95%, illustrating its efficacy in motivating students via gamification. The approach eradicates bias by selecting the first student to push the buzzer, so guaranteeing equal opportunity for all learners—90% of students concurred that EduBuzz offered a more equitable selection procedure than teacher-based methods. Moreover, classroom management enhanced, with educators indicating a 30% increase in questions addressed per session due to immediate student selection, hence minimizing distractions and improving course continuity. The organized method prompted reticent pupils to engage, generating a more inclusive educational atmosphere. Minor technical difficulties, such as delays in response registration, were observed but can be addressed through system enhancements and user training. EduBuzz serves as an effective instrument for enhancing participation, efficiency, and equity, establishing itself as a feasible technology-driven innovation for interactive classroom learning.

5. FIGURES AND TABLES

Aspect	Traditional Q&A	With EduBuzz	Student Agreement
Student Engagement	50% Participation	95% Participation	95% agreed it improved engagement
Fairness in Selection	Teacher-selected	First to press answers	90% found it fairer
Time Efficiency	Slower student selection	30% more questions covered	Teachers reported 30% efficiency gain
Classroom Management	Some disruptions	More structured and focused learning	Encouraged quieter students to participate

Key Findings from The Results, Comparing Traditional Q&A Methods with The Edubuzz System

6. CONCLUSION

This study's findings demonstrate that EduBuzz is an effective instrument for enhancing student engagement, equity, and classroom efficiency in a Form 5 Chemistry revision lesson. In contrast to conventional Q&A sessions, which saw a 50% student participation rate, EduBuzz markedly enhanced engagement to 95%, illustrating its efficacy in motivating students through gamification. The system eradicates bias in student selection, guaranteeing equitable opportunities for all learners, with 90% of students concurring that EduBuzz offered a more impartial alternative to teacher-based selection. Moreover, classroom management enhanced, with educators indicating a 30% rise in questions addressed per session, minimizing disruptions and improving lesson continuity. The organized methodology prompted reticent pupils to engage, fostering a more inclusive and vibrant educational atmosphere. Minor technological concerns, such as delays in response registration, can be resolved by system enhancements and user training. EduBuzz is a technology-driven invention that supports Sustainable Development Goal 4 (SDG 4: Quality Education) by promoting fair and dynamic learning environments. Subsequent research ought to investigate its scalability across other disciplines and educational tiers, along with potential interaction with digital learning platforms to augment student involvement.

7. RECOMMENDATIONS

To enhance EduBuzz, several improvements are proposed, including resolving technical delays in response registration via hardware and software upgrades, offering user training sessions for students and teachers to maximize efficiency, and optimizing battery life and connectivity for uninterrupted classroom operation. Future research should investigate the applicability of EduBuzz to more subjects, perform longitudinal studies to evaluate its enduring effects on student learning, and compare its efficacy with other gamified educational tools. Furthermore, prospective improvements entail the development of a mobile application for monitoring student progress, the integration of gamification elements such as badges, leaderboards, and rewards to maintain engagement, the creation of a customizable question bank for educators, and the introduction of team-based answering modes to promote collaboration. By adopting these recommendations, EduBuzz can transform into a sophisticated, technology-enhanced educational tool that promotes increased engagement, inclusion, and efficiency in classrooms.

REFERENCES

1. **Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011).** Gamification: Toward a definition. *Proceedings of the CHI 2011 Gamification Workshop*, 12(2), 1-4.
2. **Hamari, J., Koivisto, J., & Sarsa, H. (2014).** Does gamification work? A literature review of empirical studies on gamification. *Proceedings of the 47th Hawaii International Conference on System Sciences (HICSS)*, 3025-3034.
3. **Wang, A. I. (2015).** The wear-out effect of a game-based student response system. *Computers & Education*, 82, 217-227.
4. **Zainuddin, Z., & Perera, C. J. (2019).** Exploring student perspectives of using gamification in flipped classrooms: A qualitative approach. *Computers & Education*, 141, 103611.
5. **Kay, R. H., & LeSage, A. (2009).** Examining the benefits and challenges of using audience response systems: A review of the literature. *Computers & Education*, 53(3), 819-827.

6. **Lai, C. L., & Hwang, G. J. (2016).** A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course. *Computers & Education*, 100, 126-140.
7. **Johnson, D., Deterding, S., Kuhn, K. A., Staneva, A., Stoyanov, S., & Hides, L. (2016).** Gamification for health and well-being: A systematic review of the literature. *Internet Interventions*, 6, 89-106.
8. **UNESCO (2015).** Education 2030: Incheon Declaration and Framework for Action. UNESCO Publishing.