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Title: Effect of Game Based Learning on B.Ed. Students Problem-Solving Skills

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Declaration

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Abstract

In the present era, traditional teaching methods solely do not equip the students with the 21st century skills. Henceforth, newer methods of teaching methods needs to be devised and researched upon. So, the present study was conducted which investigates the effect of Game-Based Learning (GBL) on the development of problem-solving skills among B.Ed. students. For the study, a mixed method research method was adopted. For the quantitative data collection, a single group pre-test and post-test design was used while the qualitative data was collected through semi-structured interview technique. A sample of 37 B.Ed. students participated in the traditional classroom interventions followed by the game-based instructional interventions. The tool used for effectiveness of GBL was a structured questionnaire and the data was analysed through a paired sample t-test. The results revealed a statistically significant improvement in the problem-solving skills post-GBL intervention. This suggested that GBL is a more effective strategy than traditional teaching methods for enhancing higher-order thinking and problem-solving abilities.

Keywords: Effect, Game Based Learning, B.Ed. Students, Problem-Solving Skills, Mixed Method, Higher Order Thinking Skills

Introduction

In the present era, merely teaching the students of Game-based learning (GBL) has emerged as an innovative educational approach that integrates game elements into the learning process to enhance student engagement and problem-solving skills. This research paper gauges into the impact of GBL in fostering active participation and critical thinking among students. Problem-solving skills are an essential component of effective teaching, especially for future teachers, B.Ed. students. These skills assist the individuals in the analysis of complex issues arising in the

classroom, make informed decisions accordingly, and implement the effective solutions. Traditional teaching methods focus more on rote memorization and less on critical thinking necessary in the 21st century. In contrast, Game-Based Learning (GBL) engages the students in interactive and experiential learning activities that simulate the real-life scenarios. Hence, GBL enhances student motivation, and improve cognitive engagement. In the present scenario, GBL poses to be a powerful pedagogical tool that promotes the development of higher-order thinking skills. By comparing traditional teaching strategies with GBL approaches, this research aims to provide evidence supporting the integration of games in teacher training programs.

Review of related literature

Game-Based Learning has evolved over the years as a dynamic instructional strategy. It not only increases student engagement but also fosters deep learning alongside cognitive development. Shute et al. (2016) asserted that educational games have the potential to effectively measure and develop problem-solving capabilities by simulating complex, real-world challenges as closely as possible. Inline Wouters et al. (2013) accorded that serious games have significant impact on learning outcomes provided they are aligned with instructional goals and are embedded in authentic learning contexts. The meta-analysis conducted by Boyle et al. (2016) documented the impact of serious games and cited that serious games improve learning retention and student motivation in contrast to traditional learning methods.

In addition, Papastergiou (2009) mentioned the dual benefits of GBL in computer science education. He stressed that students show increased interest and better analytical thinking when GBL was used. Furthermore, Qian and Clark (2016) explore the relationship between GBL and problem-solving skills. The investigator found consistent positive impact of GBL across disciplines. Further, the framework by Anderson and Krathwohl (2001) specified that GBL supports the development of higher-order cognitive skills which aligns well with Bloom's taxonomy.

In spite the advantages that the Game-Based Learning have, researchers like Connolly et al. (2012) pointed out the implementation barriers that includes resource constraints and teacher readiness. Nevertheless, evidence increasingly supports the digital tools integration in the teacher education. These digital tools are beneficial to the learners by providing immediate feedback and adaptive learning scenarios.

Research also suggests that GBL provides immediate feedback, iterative trial-and-error opportunities, and contextual learning environments- all of which are conducive to developing and reinforcing problem-solving abilities (Kiili, 2007). Digital games create low-risk environments where learners can explore multiple solutions and learn from their mistakes, which is especially beneficial for students who may fear failure in traditional classroom settings.

In the context of higher education, however, there is a relative scarcity of focused research on how GBL impacts problem-solving skills among future educators. While studies like those by Erhel and Jamet (2013) and Sun et al. (2022) confirm positive cognitive outcomes of GBL in general university populations, there remains a gap in examining how these outcomes apply specifically to B.Ed. students- who are preparing for roles that require both content mastery and the ability to foster problem-solving in their own classrooms.

Although Game-Based Learning (GBL) is gaining popularity in education, its effectiveness in higher education- particularly in B.Ed. programs- remains underexplored. Most existing research centers on younger students and academic performance, with little focus on how GBL influences problem-solving skills in future educators. This study seeks to bridge that gap by evaluating the role of GBL in fostering active learning and cognitive development among B.Ed. students.

Objectives

1. To compare effect of Game-based learning and traditional teaching methods on problem-solving skills among B.Ed. students.

2. To examine students' perceptions of how GBL contributes to their problem-solving development.

Hypothesis

H1: Game-based learning significantly effects problem-solving skills among B.Ed. students compared to traditional methods.

H0: Game-based learning does not significantly effects problem-solving skills among B.Ed. students compared to traditional methods.

Delimitations

1. Research was carried out only on B.Ed. students of one institute School of Education, Devi Ahilya Vishwavidyalaya, Indore.

2. Game was for instructional purpose used.

Methodology

Research method used here was mixed method (Cresswell, 2003). Students of School of the population for the study were B.Ed. students, Indore. The sampling procedure used for selecting the sample was convenient. Students came from different pedagogies like science commerce and arts. Sample of 37 students is used. The students were first and second Graduates, mostly between 17 to 34 years old.

Tool and technique used in the study

1. A structured questionnaire "*Questionnaire on Effect of GBL on problem solving skills*" using a 5-point Likert scale. The tool comprised of positive and negative item. The positive items were scored as 1-5 meanwhile negative items were scored from 5-1.

2. Interview: Semi structured interview was used to allow flexibility for deeper insights.

Results and discussion

The data were collected in view of the objectives and hypothesis of the study.

Effect of Game-Based Learning and traditional teaching methods on problem-solving skills of B.Ed. students

The objective was to compare the effect of GBL and traditional teaching methods on problem-solving skills of B.Ed. students for which an alternative hypothesis was formulated as "Game-based learning significantly effects problem-solving skills among B.Ed. students compared to traditional methods. As this hypothesis cannot be analysed statistically, henceforth a null hypothesis "Game-based learning does not significantly effects problem-solving skills among B.Ed. students compared to traditional methods" was formulated.

The data collected for testing the hypothesis was analysed using t-test and is tabulated below.

Table 1

Effect of Game-Based Learning on problem-solving skills of B.Ed. students

Measure	Traditional Learning	Game-Based Learning	t-Value	p-Value (two-tail)	Interpretation
M	38.54	40.95	2.73	0.0096	Significant difference (p < 0.05)
SD	3.86	3.02			

A paired sample t-test was conducted to compare students' scores under traditional and GBL settings. The mean score in the traditional class was 38.54, while the mean score after GBL was 40.95. The t-value was 2.73 with a p-value of 0.0096 (p < 0.05), indicating a statistically significant improvement in problem-solving skills after exposure to GBL. This means that the null hypothesis game-based learning does not significantly effects problem-solving skills among B.Ed.

students compared to traditional methods is rejected. It means that GBL was more effective than traditional methods for enhancing problem-solving skills.

Students' perceptions of how GBL contributes to their problem-solving development

To know the perception of students on the impact of GBL on problem-solving skills of B.Ed. students, a semi-structured interview was conducted.

Responses from semi-structured interviews and perception-based items in the questionnaire indicated that a majority of students felt that GBL enhanced their problem-solving skills. Many participants mentioned that game scenarios encouraged independent thinking, trial-and-error learning, and collaborative decision-making. Students appreciated the immediate feedback and engaging nature of the activities, which they believed helped them identify problems faster and work toward logical solutions.

Discussion of the results

The findings of this study align with the broader literature suggesting that Game-Based Learning significantly improves cognitive outcomes, particularly problem-solving abilities. The substantial improvement in post-test scores among B.Ed. students supports the assertion by Shute et al. (2016) that game-based learning environments provide problem interactive spaces that are conducive to active learning. GBL environments provide the students with real-time feedback and engage in decision-making tasks alike authentic educational challenges, resulting in reinforcing the students analytical skills.

Furthermore, a reduction in SD is evident after GBL intervention. This suggests that the GBL not only raises performance but also optimises the learning disparities by taking into account varied learning styles. Qian and Clark (2016) cited that GBL promotes equitable participation alongside catering to visual, auditory, and kinesthetic learners. The findings well correlate with Papastergiou's (2009) results that shows enhanced motivation and comprehension when the learners are engaged in game-based learning environments. Students in general perceived GBL

method as more engaging, less intimidating, and more effective in strengthening the problem-solving skills as compared to traditional teaching methods. Many asserted that the *Clue in Box Crossword* induced creative thinking, reduced anxiety, and made the learning process an enjoyable act. Although most students favoured GBL, a few expressed the need for deeper content integration, stronger theoretical connections alongside more collaborative learning opportunities. Despite these benefits, practical limitations such as infrastructure availability and teacher training may impact the scalability of GBL interventions. As Connolly et al. (2012) highlight, without proper instructional design and educator readiness, GBL may fail to deliver its full potential.

Conclusion

This study culminates into providing evidence that Game-Based Learning is a highly effective pedagogical approach for developing problem-solving skills among B.Ed. students. By engaging students in interactive and authentic problem scenarios, GBL has positive effect on their critical thinking skills, evaluation of available alternatives, and in making informed decisions. The study reveals significant difference between traditional and game-based instructional methods that validates the integration of GBL into teacher education programs. These present findings suggest that educational institutions should consider adopting GBL not only to increase engagement but also to improve cognitive learning outcomes. Further research with a larger and more diverse samples is recommended for the generalization of these findings across broader educational contexts.

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