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ORIGINAL RESEARCH

Comparison of gamification versus small group discussion on academic performance in pharmacology amongst 2nd Prof MBBS students

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ABSTRACT

Objective: To compare the academic performance of 2nd Prof MBBS students after exposure to gamification-based learning versus small group discussions in Pharmacology.
To assess student and faculty perceptions regarding gamification based learning and small group discussion.

Methods: 150 students studying in 2nd prof MBBS in Pharmacology department were randomly assigned to two equal groups. All students were made to take a pre-test comprising of 20 MCQs to assess baseline knowledge. Both groups were taught same topics of Pharmacology, one by gamification based teaching and other by traditional small group teaching. At the end of four sessions, all 150 students were made to take a post-test comprising of 20 MCQs, which was same like pre-test. A validated questionnaire was circulated amongst students and faculty to analyse their perception regarding gamification based learning and small group discussion.

Results: Statistical analysis was done by paired t test. Questionnaire was analysed on 5-point Likert scale.

Conclusion: Gamification based teaching is better than traditional small group discussion.

Key words: gamification, small group discussion, perception

INTRODUCTION

In medical education, traditional teaching methods such as small group discussions (SGDs) have been instrumental in fostering collaborative learning and critical thinking among students. However, with the advent of technology and the evolving learning preferences of students, there is a growing interest in innovative pedagogical approaches. One such approach is gamification, which involves integrating game design elements into educational contexts to motivate and engage learners. This project is crucial for revitalizing learning experiences by infusing engagement and interactivity into a traditionally complex subject. Pharmacology, which traditionally relies on memorization and application of complex concepts, can benefit from the interactive and dynamic aspects of gamification. Studies suggest that gamified learning environments improves student motivation, knowledge retention, and active participation. Medical students, when exposed to gamified case studies, engage in active problem-solving, which enhances diagnostic reasoning and decision-making skills.

Traditional teaching methods, such as small group discussions (SGDs), while effective in promoting collaborative learning, often struggle to maintain high levels of student engagement and may not fully address diverse learning preference [1]. In the context of MBBS education, particularly in complex topics, this can lead to reduced motivation, passive learning, and variable academic performance [2].

Competency based medical education is a students' cantered curriculum necessitates the need of various competencies acquired through small group teaching, integrated teaching, early clinical exposure, self-directed learning, and continuous formative assessments [3].

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Furthermore, with the increasing emphasis on producing well-rounded Indian medical graduates (IMGs) equipped with critical thinking, clinical reasoning, and lifelong learning skills, there is a pressing need for innovative teaching approaches [4].
Gamification, which incorporates game-based elements into education, offers a promising alternative by enhancing engagement, promoting active learning, and potentially improving both immediate academic performance and long- term knowledge retention [5].
However, there is limited evidence on the effectiveness of gamification compared to traditional SGDs in achieving these outcomes among 2nd Prof MBBS students [6].
This study will implement a gamification-based learning approach as an intervention for teaching systemic pathology to 2nd Prof MBBS students, comparing it against traditional Small Group Discussions (SGDs).

MATERIAL AND METHOD

The study was carried out at G S Medical College and hospital with approval from IEC.
STUDY SETTING AND PARTICIPANTS - 150 students studying in 2nd Prof MBBS in the Pharmacology department.
RANDOMIZATION PROCESS - 150 Students were randomly assigned to two equal groups (75 each) using a computer-generated random number sequence. This ensures truly random allocation and reduces potential selection bias. The updated strategy enhances the validity and reliability of the study results.
All 150 students were made to take a Pre-test comprising of 20 MCQS to assess baseline knowledge. Both groups were taught simultaneously in four sessions. Each session was of one hour duration. Same Pharmacology topics from Cardiovascular system (a. Drugs acting on Renin-Angiotensin system b. Cardiac glycosides and drugs for heart failure c. Antianginal and other anti-ischaemic drugs d. Antihypertensive drugs) were covered using different teaching methodologies (Gamification or SGD).
Gamification based teaching was done in form of Small Group Discussions by four faculty members in different rooms in four groups comprising of 18-19 students. All sessions were structured and time bound. A Scoring System was maintained where points for correct answers were given. A leaderboard will display rank of students based on performance. Gamification activity will be done using Kahoot App as follows –

1. **"Virtual Patient Case Challenge**" was given to the Gamification group where students will be provided brief clinical history and students were asked in multiple questions in sequential manner to take the case further by Interactive Decision making, interpreting clinical features and making final diagnosis. At the end of the challenge, all questions will be fully explained.

2. **"Competitive speed diagnosis challenge"** was given to the gamification group where multiple Pharmacology images on the topic which were being taught were uploaded and the students were asked to answer within a time limit of 30 seconds for each image. Students were competing for points. Correct answer earned them one point and wrong answer deducted their one point. At the end of the challenge, all images were fully explained.

Traditional Small Group Discussions were taken by four faculty members in different rooms in four groups comprising of 18-19 students in each group. Faculty was present a clinical based scenario on the same topic, which was discussed and analyzed by the students. At the end of four sessions, all 150 students were made to take a post-test comprising of 20 MCQS which were same like pre-test. A peer validated feedback questionnaire was circulated amongst students and faculty members and analysis of their perceptions regarding gamification based learning and small group discussion was done.
The questions on perceptions were prepared and validated by medical education experts. They were as follows:

1. I liked all the digital tools used
2. Gamification made me remember the lecture content better
3. Gamification kept me active throughout the class
4. Gamification helped me in better understanding of the key concepts
5. Gamification motivates me to prepare and read more
6. Gamification gave me more opportunities for interaction with faculty
7. I would recommend use of gamification for other classes

STATISTICAL ANALYSIS

QUANTITATIVE ANALYSIS - Paired t test was used for Pretest Vs Post test comparison within each group. Independent t test was used for comparison between Gamification and SGD groups. $P < 0.05$ was considered significant.
QUALITATIVE ANALYSIS- 5-point Likert scale was used with open ended questions.

RESULTS

The statistical analysis by paired t test was done to evaluate pre and post test scores. $P<0.05$ was taken as significant. The data suggested a significant increase in post-test scores ($P<0.0007$)
136 students out of 150 had attended all the four classes involving gamification and responded to the perception questionnaire. Students who were absent for any of the four classes involving gamification were excluded from the study.

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The mean and standard deviation for questions on student perceptions on gamification are as shown in Table 1. A positive response was seen for all the questions on student perceptions. Overall, the responses suggest that gamification can have number of positive effects on learning including:

1. Increased engagement and motivation
2. Greater challenge and reward
3. Enhances learning

Table 1 – Mean and standard deviation (SD) for perception questions

S. No.	Question	Mean	SD
1	I liked all the digital tools used	4.03	0.85
2	Gamification made me remember the lecture content better	4.24	0.88
3	Gamification kept me active throughout the class	4.26	0.82
4	Gamification helped me in better understanding of the key concepts	4.15	0.79
5	Gamification motivates me to prepare and read more	4.07	0.86
6	Gamification gave me more opportunities for interaction with faculty	4.33	0.80
7	I would recommend use of gamification for other classes	4.26	0.87

DISCUSSION

In this prospective, interventional study, we determined that the phase II MBBS students perceive gamification as a better method as compared to traditional, non-gamified, lectures. The students responded with overwhelming positive agreement to statements regarding gamification in their learning experiences. The reliability analysis showed excellent consistency.

The need for change in our approach to adult learning is the need of the time. It had been recognized by educational researchers that the traditional pedagogical approaches are inadequate. Also, the present generation of students are adult learners who have grown up in the technological era, well equipped with good knowledge and expertise of computers, smart phones, and the internet. Medical schoolteachers are constantly trying out innovative strategies like gamification, to improve adult learning experience [7].

Our study results support the idea that gamification increases learner engagement, motivation, interaction, understanding and retention. Further prospective, research is needed to determine whether gamification can lead to improvements in examination scores and pass rates and patient outcomes in long term.

CONCLUSION

Our results support that gamification was well accepted by students and it increases motivation, engagement, and interaction, compared to traditional didactic lectures.

AUTHOR'S CONTRIBUTION

Dr. Shipra Kaushik contributed in concept and design of the study and in analysis of data. Drafting and revision of manuscript was done by Dr. Harshwardhan and Dr. Vishakha.

CONFLICT OF INTEREST

Nil

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