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Original Article

Education Section

Student Perceptions of a Non-digital Gamified Student-generated MCQ Strategy in Undergraduate Physiotherapy Education: An Exploratory Mixed-methods Study

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ABSTRACT

Introduction: Traditional lecture-based teaching methods often struggle to maintain student engagement, especially in the context of decreasing student attention spans. Innovative, active-learning strategies are needed to address these challenges. Gamification is one such strategy that can enhance student engagement. Limited evidence exists in physiotherapy education regarding gamified student-generated Multiple Choice Question (MCQ) strategies.

Aim: To evaluate undergraduate physiotherapy students' perception of a non digital gamified MCQ-based teaching-learning strategy.

Materials and Methods: The present exploratory mixed-method study was conducted at KLE College of Physiotherapy, Hubballi, Karnataka, India, from July 2025 to November 2025. Fifty undergraduate third-year physiotherapy students participated voluntarily through convenience sampling in a single classroom session. The session began with a traditional lecture, followed by an assignment where students generated MCQs based on the taught topic. Students were divided into two groups of twenty-five each to facilitate participation in the gamified, competitive MCQ quiz session, moderated by the subject expert. Quantitative feedback was collected using a five-point Likert scale and analysed using descriptive statistics and the Mann-Whitney U test. Qualitative data from open-ended questions were analysed thematically. Statistical analysis was performed using Statistical Package for Social Sciences version 30.

Results: A total of 85-95% of students reported improved engagement and perceived learning. No objective learning outcomes were measured. While 65% felt confident about the topic post-session, only 50% agreed that referencing textbooks improved learning. Qualitative feedback highlighted increased critical thinking, collaboration, and enjoyment, though some students noted challenges in time management and MCQ quality. No significant differences were found between groups for any of the ten items, indicating broad applicability.

Conclusion: The present study shows that a non digital, student-generated MCQ gamification approach is feasible and well accepted, with high engagement and perceived learning. However, its effect on knowledge gain and retention remains unclear due to the absence of objective measures and a controlled design. Future studies should include MCQ training, objective assessments, and longitudinal designs to confirm its impact.

Keywords: Innovative learning, Multiple choice questions, Student engagement, Teaching-learning methods

INTRODUCTION

Teaching and learning are dynamic processes. The effectiveness of these processes is greatly influenced by the attention span of learners, as sustained focus is crucial for absorbing new information. Students today experience significantly shorter attention spans [1,2]. Research suggests that teaching strategies incorporating active learning and periodic shifts in attention can enhance learning outcomes by aligning with students' attention and cognitive capabilities [3]. Therefore, there is a need for educators to adapt their teaching methods to keep students engaged. Traditional classroom teaching often relies heavily on lectures and teacher-led discussions, which may inadvertently limit student engagement and critical thinking [4]. As educational institutions grapple with such challenges, there is an imperative need to develop innovative, scalable, and effective teaching strategies.

Gamification has emerged as a promising pedagogical approach to enhance engagement and motivation among learners. A review article on gamification has primarily focused on digital strategies such as Kahoot-based quizzes and escape room-style puzzles [5]. However, in contrast to these digital approaches, the present study utilises a non digital, interactive quiz format without technological support. Non digital gamification is particularly valuable in promoting direct student interaction, collaborative learning, and active participation, rather than passive digital involvement. Furthermore, the process of student-generated Multiple-Choice Questions (MCQ) encourages higher-order thinking, as it engages learners at the highest levels of Bloom's taxonomy, including analysis, evaluation, and creation [6].

The present study proposed a teaching-learning method integrating non digital gamification with student-generated MCQs. The study aimed to assess its perceived effectiveness based on student perceptions. To the best of knowledge, such a combined approach has not been explored in physiotherapy education within the Indian context.

MATERIALS AND METHODS

The present exploratory mixed-method post-intervention study was conducted in which both quantitative and qualitative approaches were combined to comprehensively evaluate the perceived effectiveness of the teaching-learning method. The study was conducted at KLE College of Physiotherapy, Hubballi, Karnataka, India, from July 2025 to November 2025. The Quantitative data were collected through a structured, researcher-developed feedback questionnaire. The responses marked on a Likert scale were converted to numerical scores, while qualitative data were gathered through open-ended questions, which captured students' perceptions and experiences. The study was carried out after receiving approval from the Institutional Ethics Committee (Ref

No: JGMMMC/IEC/111/2025) from KLE JGMM Medical College, Hubballi, Karnataka.

Sample size: The sample size was estimated at 50, with assignment of students into two groups (A and B) with 25 students in each group. A pragmatic sample size of 50 students was used, corresponding to the available cohort of third-year physiotherapy students during the study period, aligning with recommendations by Besekar S et al., (2024) that studies on novel educational interventions typically require about 24-30 participants per group to balance statistical power, feasibility, and methodological rigour [7].

Inclusion and Exclusion criteria: The study included all third-year BPT students who were invited to participate in the study, and all 50 consented. Students who were unwilling to participate, absent during the theory class, or absent on the day of the study were excluded.

Study Procedure

Traditional teaching: The topic pulmonary rehabilitation was delivered using standard lecture-based instruction, including slides and blackboard explanations, lasting approximately 45 minutes.

MCQ generation: Each student was instructed to create two MCQs based on the taught topic, with reference to at least one textbook, and to submit them after two days. These MCQs were then standardised and reviewed by faculty, enabling the teacher to moderate and select one appropriate question per student for use in the quiz session.

Group division: Students were allocated into two subgroups of 25 each (Group A and Group B) using an alternate sequential allocation method, wherein alternate students were assigned sequentially to each group. Although students were divided into two subgroups for participation in the gamified activity, both groups received the same intervention.

Gamification session: One student from Group A posed one of their MCQs orally to Group B, who discussed and provided a collective answer. Correct answers earned one point; incorrect answers earned none. Immediate verbal feedback was provided after each response. A student from Group B then posed an MCQ to Group A. The process alternated until all students had presented one MCQ each (50 questions total). The teacher moderated and verified answers by cross-checking the responses with the predetermined correct answers of the student-generated MCQs and confirming their accuracy based on subject expertise before assigning scores on a blackboard.

Outcome: Group scores were recorded during the activity.

Feedback: Post-session, a researcher-developed feedback survey was shared with the students digitally, which collected anonymous feedback on enjoyment, perceived effectiveness, challenges in MCQ creation, engagement with reference materials, and desire for regular implementation. The feedback questionnaire had questions to be answered on a Likert scale as well as open-ended questions. The data were collected digitally immediately by the teacher post-session.

STATISTICAL ANALYSIS

Statistical analysis included calculating frequencies and descriptive statistics for responses. As students participated in two operational subgroups during the activity, the Mann-Whitney U test was used only to evaluate consistency of response patterns between subgroups (A and B) rather than intervention effects. The qualitative data underwent thematic analysis. Quantitative feedback was collected using a five-point Likert scale and analysed using descriptive statistics and the Mann-Whitney U test. Qualitative data from open-ended questions were analysed thematically. The quantitative data were analysed using SPSS software version 30.0.0.

RESULTS

Highest agreement was noted in the responses for teacher moderation (96%), gamification (90%), MCQ creation (90%), reinforcement of knowledge (90%), and need for similar sessions (90%). 90% of students agreed or strongly agreed that the session was engaging, helpful, and promoted learning. Only 50% agreed that referencing textbooks improved learning. 65% of students felt confident about the topic after the session. The data revealed mean scores greater than 4.2 for most items with minimal variation (SD≤ 0.6), highlighting a steady pattern of favourable feedback [Table/Fig-1].

As both subgroups participated in the same session, the Mann-Whitney U test was used solely to assess consistency of responses. No statistically significant differences were observed between subgroups for any item (all p>0.05), indicating uniformity of perceptions across the cohort [Table/Fig-2].

Question	SA n (%)	A n (%)	N n (%)	D n (%)	SD n (%)	Mean±SD
1. Lecture helped understanding	15 (30%)	28 (56%)	7 (14%)	0	0	4.16±0.64
2. Creating MCQs deepened understanding	30 (60%)	15 (30%)	5 (10%)	0	0	4.50±0.67
3. Referencing textbooks improved learning	10 (20%)	15 (30%)	20 (40%)	5 (10%)	0	3.60±0.92
4. Gamification session was engaging	32 (64%)	13 (26%)	5 (10%)	0	0	4.54±0.67
5. Group discussion enhanced critical thinking	20 (40%)	23 (46%)	7 (14%)	0	0	4.26±0.69
6. Answering MCQs reinforced knowledge	28 (56%)	17 (34%)	5 (10%)	0	0	4.46±0.67
7. Competitive element motivated participation	8 (16%)	32 (64%)	10 (20%)	0	0	3.96±0.60
8. Teacher's moderation was helpful	35 (70%)	13 (26%)	2 (4%)	0	0	4.66±0.55
9. Confidence after session	8 (16%)	25 (50%)	15 (30%)	2 (4%)	0	3.78±0.76
10. Would like similar sessions	27 (54%)	18 (36%)	5 (10%)	0	0	4.44±0.67

[Table/Fig-1]: Percentage distribution of student responses (N=50).
SA: Strongly agree; A: Agree; N: Neutral; D: Disagree; SD: Strongly disagree.
Note: Descriptive statistics (frequencies, percentages, mean±standard deviation) were used.

Question	Median Group A	Median Group B	U Statistic	p-value
1	4	4	255	0.22
2	4	4	285	0.42
3	3.5	3.5	315	0.75
4	5	4	245	0.18
5	4	4	275	0.35
6	5	4	280	0.38
7	4	4	305	0.62
8	5	5	315	0.75
9	4	4	295	0.53
10	5	5	315	0.75

[Table/Fig-2]: Statistical comparison of Group A and B using the Mann-Whitney U test (n=25 each).
Note: Statistical test used: Mann-Whitney U test; p<0.05 considered statistically significant

Students described the session as fun and interactive (n=30). Many students (n=30) valued creating their own MCQs and learning through group discussion as part of the interactive session. Thirty-eight students felt that MCQ creation promoted critical thinking and self-learning. Twenty students experienced challenges related to time management or question quality. Twenty-three students expressed reservations regarding textbook referencing [Table/Fig-3].

Theme	Some representative quotes	Frequency (N=50)
Engagement and active learning	1. "The quiz game made learning fun and interactive." 2. "I enjoyed making my own questions and seeing how others answered them." 3. "Working in groups helped me learn from my classmates."	30
Deeper understanding and self-assessment	1. "It made me think more deeply about the topic." 2. "I had to really understand the material to make good questions." 3. "It helped me realise what I didn't know."	38
Challenges: time and question quality	1. "Some questions were confusing or too hard." 2. "We sometimes felt rushed during the group discussions." 3. "It was difficult to agree on answers as a group sometimes."	20
Suggestions for improvement	1. "Give us examples of good MCQs before the activity." 2. "Maybe review the student-made questions before the quiz." 3. "Smaller groups or more time for discussion would help."	23
Desire for repetition and preference	1. "I would like to do this for other topics." 2. "This was much better than just listening to a lecture." 3. "I felt more motivated to prepare for this session."	18
Textbook referencing	1. "Referencing textbooks for each MCQ was time-consuming." 2. "Sometimes I wasn't sure how to properly cite the textbook." 3. "Finding relevant information in the textbook took longer than expected."	13
Stress but positive learning	1. "It was a bit stressful, but I learned a lot." 2. "Despite feeling nervous, I remember the material better now." 3. "The pressure made me pay more attention during the session."	10

[Table/Fig-3]: Thematic analysis of student perceptions and experiences.
Note: Data analysed using thematic analysis.

DISCUSSION

The present study explored student perceptions of a non digital gamified, student-generated MCQ approach in undergraduate physiotherapy education. The findings demonstrate consistently high levels of engagement, perceived learning, and satisfaction among students, with 85-96% reporting positive experiences across most domains. However, these findings must be interpreted cautiously, as the study did not include objective measures of learning outcomes.

The high levels of engagement observed in this study are consistent with existing literature on gamification, which highlights its ability to enhance motivation, participation, and classroom interaction [8,9]. Gamified strategies, especially those involving competition and collaboration, are known to stimulate active involvement and sustain attention [5,10]. However, the relatively lower mean score for the item "competitive element motivated participation" (3.96) indicates that competition was not the primary factor driving engagement in this study. This may be due to the activity design, which placed greater emphasis on collaboration and group discussion, thereby reducing the influence of competition. Additionally, differences in student preferences, with some learners being less motivated by competitive settings, may have contributed to this outcome. These findings suggest that the impact of competition may vary depending on the learning context and its integration with cooperative elements.

In the present study, the combination of peer interaction, competition, and instructor moderation likely contributed to the positive perceptions reported by students. Additionally, the process of generating MCQs may have promoted higher-order cognitive processes such as analysis and evaluation, as suggested by prior work on Bloom's taxonomy [6].

A notable aspect of the present study is that students did not receive formal training in MCQ construction prior to the activity. Nevertheless, the high proportion of positive responses regarding MCQ creation (90%) indicates that students were able to engage effectively with the task even without prior training. This may reflect the intuitive nature of MCQ-based learning and students' existing familiarity with such assessment formats. Similar findings have been reported by Yu FY and Cheng WW (2022), who demonstrated that student-generated questions facilitate deeper cognitive processing and enhance conceptual understanding [11].

Importantly, faculty moderation and validation of the student-generated MCQs before their use likely ensured accuracy and appropriateness, thereby preserving the educational integrity of the activity. Such oversight may have reduced issues related to ambiguous or poorly constructed questions, although some students still identified this as a challenge. These observations suggest that while formal training in MCQ writing could further improve the quality of student-generated content, faculty supervision remains a crucial safeguard when implementing such approaches in classroom settings. In line with this, Papadopoulos C et al., reported that although student-generated content is beneficial, appropriate scaffolding remains essential in similar student-centered learning strategies to ensure content quality and manage cognitive load [12]. In the present study, teacher moderation also facilitated discussions, clarified ambiguities, and maintained the flow of the session, likely enhancing student confidence, engagement, and perceived learning. These findings highlight the critical role of active faculty involvement in student-generated and gamified learning strategies.

Although students reported improved understanding and reinforcement of knowledge, only 65% expressed increased confidence, despite high engagement levels (90%). This difference may be attributed to the nature of the activity, which emphasised active participation, peer discussion, and higher-order thinking rather than objective assessment of learning. The process of generating and answering MCQs may have also made students more aware of gaps in their understanding, thereby affecting their confidence. Additionally, the absence of formal evaluation may have limited their ability to accurately judge their competence. Incorporating formative assessments in future implementations may help bridge this gap. As no objective measures of knowledge gain or retention were included, conclusions regarding academic performance cannot be drawn. Consistent with previous studies, increased engagement and enjoyment do not necessarily translate into improved learning outcomes or long-term retention [13-15].

The current study also identified important challenges. Referencing textbooks scored lowest (3.6±0.92), suggesting students found this step cumbersome or unclear. The effectiveness of textbooks as a resource depends on their accessibility and how intuitively students can use them. This result likely indicates variation in how students approached the task, with some using textbooks actively and others relying on prior knowledge or peer discussion rather than additional time for study. The challenges reported with textbook referencing may have affected the quality of learning, as difficulty in locating relevant information and uncertainty in using references could limit deeper engagement with core concepts. If students find textbooks difficult to navigate or not directly relevant to the active task, their engagement and satisfaction decrease [16]. The findings suggest a need for clearer instructions or better integration of textbook use

within the activity. When students understand how and why to use a resource, and when it is directly tied to their learning goals, engagement improves [17].

Since students were aware they were participating in a study, a Hawthorne effect cannot be completely excluded. However, the session was conducted as a regular classroom activity, without highlighting any expected outcomes, and feedback was collected anonymously. These measures likely reduced any change in student behaviour, although this remains a common limitation in perception-based educational studies.

An important methodological consideration is that both groups in this study participated in the same session, and therefore, the lack of statistically significant differences between Group A and Group B reflects consistency of student perceptions rather than comparative effectiveness. This further reinforces the exploratory nature of the study.

The findings of this study have educational significance, as the approach may enhance student learning while providing a simple and active learning strategy that can be effectively integrated with traditional teaching methods.

Overall, the findings suggest that non digital gamification combined with student-generated MCQs is a feasible and well-accepted teaching strategy that enhances engagement and promotes active participation. However, its impact on objective learning outcomes remains uncertain. Also, non digital gamification strategies may be particularly useful in low-resource educational settings where technological infrastructure or digital accessibility is limited. Future studies should incorporate structured training in MCQ construction, controlled study designs, pre- and post-intervention assessments, and evaluation of long-term knowledge retention to establish its true educational effectiveness.

Limitation(s)

The present study has a few limitations. It was conducted at a single institution with a relatively small sample size, which may limit the generalisability of the findings. Also, the study did not include a control group or independent comparison groups, preventing evaluation of intervention effectiveness. As the study was based on students' perceptions of the teaching-learning methodology, no objective measures of learning outcomes (such as pre- and post-tests or long-term retention assessments) were included; future studies should incorporate these to provide a more comprehensive evaluation. The study evaluated only a single session, limiting insights into sustained impact or long-term educational benefits.

CONCLUSION(S)

The present study demonstrated that a non digital gamified, student-generated MCQ approach is a feasible and well-accepted teaching-learning strategy in undergraduate physiotherapy education. The method was associated with high levels of student engagement, perceived learning, and active participation. However, due to the absence of objective outcome measures and a controlled study design, its effectiveness in improving knowledge acquisition and retention remains uncertain. Future research should incorporate structured training in MCQ development, objective assessment methods, and controlled longitudinal designs to establish the true educational impact of this approach.

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