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Original Article

Education Section

Perceptions of First-year MBBS Students towards Kahoot! as a Formative Assessment Tool in Medical Education: A Quasi-experimental Study from Howrah, India

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ABSTRACT

Introduction: Kahoot! is a gamified, real-time student response system that leverages game-design elements such as leaderboards, instant feedback, and time-based quizzes to enhance student engagement and formative assessment in educational settings. With the implementation of Competency-Based Medical Education (CBME) in India — which emphasises active learning and continuous formative feedback-evaluating the acceptability and perceived utility of such tools among preclinical medical students is important.

Aim: To assess the perceptions of first-year MBBS students regarding Kahoot! as a formative assessment tool, with respect to engagement, enjoyment, learning impact, ease of use, and gender differences in perception.

Materials and Methods: A quasi-experimental single-group post-test study was conducted among 115 first-year MBBS students of Biochemistry at JIS School of Medical Science and Research, Howrah, West Bengal, India, during November-December 2025. Consecutive sampling was used. A 12-item, five-point Likert scale questionnaire adapted from the validated instrument of Ismail and Mohammad was administered online. One open-ended question was also added. Descriptive statistics, one-sample t-tests, Chi-square goodness-of-fit tests, and Mann-Whitney U tests were used for analysis.

Results: Of 115 respondents, 97 (84.3%) agreed or strongly agreed that they enjoyed Kahoot! sessions; 95 (82.6%) perceived improved class interactivity; 88 (76.5%) reported improved subject understanding; 99 (86.1%) found the platform easy to use; and 94 (81.7%) recommended Kahoot! for future classes. Technical issues were reported by only 22 (19.1%) students. Time-pressure anxiety was mixed: 38 (33.0%) agreed, 20 (17.4%) were neutral and 57 (49.6%) disagreed. No significant gender differences were observed (Mann-Whitney U, p-value >0.05 for all items). Two types of opinions emerged from the open-ended question: engagement/motivation and technical/stress concerns.

Conclusion: First-year MBBS students perceived Kahoot! as an engaging, user-friendly, and educationally beneficial formative assessment tool. Contextually judicious integration into CBME-oriented undergraduate medical teaching is supported. Multicentric studies examining objective learning outcomes are warranted.

Keywords: Computer-assisted instruction, Education, Gamification, Learning, Medical, Motivation, Undergraduate

INTRODUCTION

Undergraduate medical education in India has undergone a significant paradigm shift with the implementation of the CBME framework for the Indian Medical Graduate, which prioritises integration, self-directed learning, early clinical relevance, and a continuous cycle of formative assessment and feedback [1]. Within this framework, assessment is expected not only to measure learning, but also to support it. Formative assessment enables students to identify knowledge gaps, regulate their learning, and improve performance before high-stakes summative examinations [2-4].

The first year of the MBBS programme, comprising Anatomy, Physiology, and Biochemistry, presents distinct pedagogical challenges. In Biochemistry particularly, meaningful learning requires conceptual understanding rather than memorisation alone. Students are exposed to a markedly increased volume of content and must adapt quickly to the demands of professional medical training. Evidence from Indian undergraduate settings also suggests that conventional lecture-based teaching in large classes may limit interactivity, timely feedback, and sustained engagement, thereby creating a need for more active and learner-centred approaches [5,6]. Technology-enhanced active learning strategies, including game-based assessment tools, therefore offer a promising complement to traditional teaching in this context [2-4].

Gamification, defined as the use of game-design elements such as points, leaderboards, timed challenges, and immediate feedback in non-game educational settings, has demonstrated potential to enhance learner motivation and engagement in health professions education [7-14]. Kahoot! is a widely used gamified student response system that enables real-time quiz-based formative assessment with instant visual feedback and peer comparison. It is accessible through smartphones and laptops and can be implemented in face-to-face, blended, and remote learning environments [7,8,10-14].

A growing body of literature supports positive student perceptions of Kahoot! across medical education contexts. Early studies reported that medical students viewed it as enjoyable, motivating, feasible, and supportive of self-regulated learning [7,8]. Similar favourable perceptions have been described among preclinical medical students in South Asia and in remote teaching settings [9,10]. Reviews and empirical studies further suggest that Kahoot! and related gamified tools may enhance participation, classroom dynamics, and, in some settings, academic performance or prediction of examination outcomes; however, these benefits remain context-dependent, and repeated use may reduce novelty over time [11-23]. Effective educational use therefore depends on aligning game mechanics with clear learning objectives and sound assessment design [20].

Recent evidence has increased the relevance of this discussion to lower-middle-income and Indian settings, where readiness for e-learning and technology-enhanced assessment may vary [24]. Indian studies in undergraduate medical education have

also reported encouraging perceptions of Kahoot! as a formative assessment tool that can improve engagement, concentration, and classroom participation [25-27]. Nevertheless, evidence focused specifically on first-year MBBS students in India remains limited. Given the curricular expectations of CBME and the specific learning demands of first-year Biochemistry, examining students' perceptions of Kahoot!-based formative assessment in this setting is both timely and educationally relevant [1-4,24-27].

The objectives of this study were: to assess perceptions of first-year MBBS students of Biochemistry regarding Kahoot! with respect to engagement, enjoyment, ease of use, and impact on learning; and to examine whether gender differences exist in student perceptions of Kahoot! as a formative assessment tool.

MATERIALS AND METHODS

This quasi-experimental single-group post-test study was conducted among first-year MBBS students enrolled at JIS School of Medical Science and Research (JISMSR), Howrah, West Bengal, India in the Department of Biochemistry, during November-December 2025. Ethical approval was obtained from the Institutional Ethics Committee (IEC Proposal No. JISMSR/IEC/2025/17). Participation was voluntary and anonymous; informed consent was obtained from all participants.

Inclusion criteria: Students with current enrolment in first-year MBBS at JISMSR were included in the study.

Exclusion criteria: Students who did not submit responses to the questionnaire; students who submitted incomplete responses were excluded from the study.

Sample size: The total first-year MBBS cohort comprised 150 students. All 150 students were invited to participate to account for non-response. Consecutive sampling was employed.

Study Procedure

Kahoot! was integrated into formative assessment sessions of the department of Biochemistry throughout the term. 10 Kahoot! sessions were conducted, each comprising 10-15 multiple-choice questions aligned with the weekly syllabus and administered at the end of lecture sessions via students' personal devices. Each session lasted approximately 10-15 minutes.

A structured, self-administered questionnaire was developed for this study. The questionnaire comprised four sections:

1. Demographics (age, gender).
2. Prior Kahoot! experience
3. A 12-item five-point Likert scale (1=Strongly Disagree to 5=Strongly Agree) assessing opinions on Kahoot! use like enjoyment, interactivity, understanding, retention, motivation, ease of use, instruction clarity, technical issues, time-pressure anxiety, recommendation, assessment preparedness, and peer motivation. A few items were adapted from the validated instrument of Ismail MAA and Mohammad JAM (Cronbach's α=0.76) [7]. Rest of the items were developed by the researchers. Overall Cronbach's α for the 12-item Likert scale used was 0.82, indicating satisfactory internal consistency.
4. One open-ended question on overall experience.

Pilot testing was done with 15 students. Final instrument reliability was satisfactory (Cronbach's α=0.82 for the Likert subscale). The survey was administered online. Participation was voluntary and anonymous; no personally identifiable data were collected. A single reminder was issued to improve response rate.

STATISTICAL ANALYSIS

Data were analysed using IBM Statistical Package for the Social Sciences (SPSS) Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequency, percentage, mean±SD) were computed. One-sample t-tests assessed whether mean Likert scores differed significantly from the neutral midpoint of 3.0. Chi-square goodness-of-fit tests assessed deviation from equal response distribution. Mann-Whitney U tests compared scores between male and female students (significance level p-value <0.05).

RESULTS

Of 150 students invited, 120 submitted responses (response rate 80.0%), of whom 115 completed all items and were included in the final analysis (n=5 excluded for incomplete responses). Demographic characteristics and prior Kahoot! experience are presented in [Table/Fig-1].

Characteristic	N (%)
Age (years), mean±SD	18.6±0.9
Gender	
Male	46 (40.0)
Female	69 (60.0)
Prior Kahoot! participation	
Yes	86 (74.8)
No	29 (25.2)
Device used for Kahoot!	
Smartphone	92 (80.0)
Laptop	17 (14.8)
Tablet	6 (5.2)

[Table/Fig-1]: Demographic and Kahoot! experience profile of study participants (N=115).

All 115 respondents reported internet access during sessions. Smartphones were the most commonly used device (92, 80.0%), and the majority (86, 74.8%) had prior experience with Kahoot! sessions.

Responses to the 12 Likert items are presented in [Table/Fig-2]. Perceptions were strongly positive for items relating to enjoyment, interactivity, understanding, ease of use, and recommendation, while responses to items on technical difficulties and time-pressure anxiety were less favourable, as expected for negatively framed items.

No.	Statement	1-SD N (%)	2-D N (%)	3-N N (%)	4-A N (%)	5-SA N (%)	Mean±SD
1	I enjoyed participating in Kahoot! quizzes	3 (2.6)	5 (4.3)	10 (8.7)	52 (45.2)	45 (39.1)	4.14±0.94
2	Kahoot! sessions made the class more interactive	2 (1.7)	6 (5.2)	12 (10.4)	54 (47.0)	41 (35.7)	4.10±0.91
3	Using Kahoot! improved my understanding of the subject	4 (3.5)	8 (7.0)	15 (13.0)	53 (46.1)	35 (30.4)	3.93±1.01
4	Kahoot! helped me retain concepts better	5 (4.3)	9 (7.8)	18 (15.7)	50 (43.5)	33 (28.7)	3.84±1.06
5	The competitive nature of Kahoot! motivated me to pay more attention	6 (5.2)	10 (8.7)	14 (12.2)	48 (41.7)	37 (32.2)	3.87±1.12
6	I found the Kahoot! platform easy to use	3 (2.6)	4 (3.5)	9 (7.8)	51 (44.3)	48 (41.7)	4.19±0.92
7	The instructions provided were clear and sufficient	4 (3.5)	7 (6.1)	13 (11.3)	56 (48.7)	35 (30.4)	3.97±0.99
8	I faced technical issues (connectivity/application delays)	40 (34.8)	38 (33.0)	15 (13.0)	12 (10.4)	10 (8.7)	2.25±1.28
9	I felt anxious or rushed due to the time limit	25 (21.7)	32 (27.8)	20 (17.4)	23 (20.0)	15 (13.0)	2.75±1.35
10	I would recommend using Kahoot! for future classes	4 (3.5)	6 (5.2)	11 (9.6)	50 (43.5)	44 (38.3)	4.08±1.00

11	Kahoot! made me better prepared for assessments	5 (4.3)	8 (7.0)	14 (12.2)	52 (45.2)	36 (31.3)	3.92±1.03
12	The competitive format motivated my peers to participate more	4 (3.5)	7 (6.1)	16 (13.9)	51 (44.3)	37 (32.2)	3.96±1.00

[Table/Fig-2]: Student perceptions of Kahoot! on a five-point Likert scale (N=115).
SD: Strongly disagree; D: Disagree; N: Neutral; A: Agree; SA: Strongly agree

One-sample t-tests confirmed that mean scores for Items 1-7 and 10-12 were significantly higher than the neutral midpoint of 3.0 (all p-value <0.001). The mean score for Item 8 (technical issues) was significantly lower than 3.0 (mean 2.25±1.28; p-value <0.001), confirming overall disagreement with experiencing technical problems. Item 9 (time-pressure anxiety) was marginally significant (mean 2.75±1.35; p-value=0.047). Chi-square goodness-of-fit tests showed significant deviation from equal distribution for all items except Item 9 (p-value=0.143), confirming a strong positive skew for perception items.

Mann-Whitney U tests comparing male (n=46) and female (n=69) students revealed no statistically significant differences in Likert scores for any item (all p-value >0.05), indicating that gender did not significantly influence student perceptions of Kahoot!.

Two primary types of opinions emerged: (1) engagement and motivation, characterised by enjoyment and heightened attentiveness; and (2) technical difficulties and time-related stress, comprising connectivity concerns and anxiety from timed responses [Table/Fig-3].

Types of opinions	Description	Representative student quotations
Engagement and motivation	Students described increased enjoyment, participation, and intrinsic motivation during Kahoot! sessions	"The game format made me study harder because I wanted to win points." "Answering under time pressure was exciting"
Technical difficulties and time-related stress	A subset reported connectivity issues and stress due to the timed response format	"Slow Wi-Fi made my answer late even though I knew it." "The timer sometimes stressed me out"

[Table/Fig-3]: Types of opinions and quotations from open-ended responses.

DISCUSSION

The present study demonstrated that first-year MBBS students of Biochemistry at JISMSR, Howrah hold broadly favourable perceptions of Kahoot! as a formative assessment tool. High agreement rates for enjoyment (84.3%), class interactivity (82.6%), ease of use (86.1%), and recommendation for future use (81.7%) are consistent with findings from comparable medical education studies [7-12,25-27]. Positive perceptions of enjoyment and engagement align with gamification theory, which posits that real-time scoring, leaderboards, and immediate feedback activate motivational pathways [13,14]. In preclinical medical education, where passive large-group instruction is common, transforming lectures into participatory quiz sessions is a meaningful pedagogical shift, particularly within the Indian CBME framework which prioritises active learning [1].

Improved subject understanding (76.5%) and concept retention (72.2%) were perceived as additional benefits. These findings are consistent with the testing effect literature demonstrating that low-stakes retrieval practice enhances long-term memory consolidation [3,4], and corroborate recent Indian findings across other undergraduate medical subjects [25]. Ease of use was the highest-rated domain (mean 4.19±0.92). The predominantly smartphone-based participation (80.0%) affirms the practical feasibility of Kahoot! implementation in settings where mobile access is more readily available than institutional computing infrastructure [8,9,23].

While the competitive element motivated 73.9% of students, approximately one-third (33.0%) reported time-pressure anxiety-a duality well documented in the gamification literature [12,22]. Wang AI and Tahir R's systematic review similarly identified time pressure as a consistent concern [12]. Educators should calibrate question timing to content difficulty and consider whether timed formats are appropriate for all learner profiles. Technical difficulties were reported by only 19.1% of students. While relatively low in prevalence, connectivity issues in resource-limited settings can undermine assessment validity and should be addressed through institutional investment in reliable internet infrastructure [24].

Importantly, no statistically significant gender differences in perception were identified (Mann-Whitney U, p-value >0.05 for all items), contrasting with some prior literature suggesting differential responses to competitive environments by gender. This may reflect the relatively homogenous cohort characteristics or the specific institutional context. Taken together, these findings support the contextually judicious integration of Kahoot! as a supplementary formative assessment modality within CBME-oriented preclinical teaching-as a complement to, not a replacement for, structured teaching, feedback dialogues, and mentored learning.

Limitation(s)

Several limitations merit acknowledgement. The post-test only quasi-experimental study design precludes causal inferences regarding the effect of Kahoot! on academic performance or long-term retention. Self-reported data are susceptible to social desirability bias. The single-institutional design from a single city limits generalisability to other settings with different demographic profiles, resource levels, or institutional cultures. No comparative arm was included, precluding relative effectiveness comparisons. Objective learning outcomes were not assessed. Future multicentric studies with experimental designs and objective outcome measures are needed.

CONCLUSION(S)

First-year MBBS students of Biochemistry at JIS School of Medical Science and Research, Howrah, West Bengal perceived Kahoot! as an engaging, user-friendly, and educationally beneficial formative assessment tool. The platform enhanced perceived class interactivity, motivation, and subject understanding with minimal technical difficulties. Gender did not significantly influence student perceptions. These findings support the thoughtful integration of Kahoot! into CBME-oriented undergraduate medical education as a supplementary formative strategy. Multicentric studies with objective learning outcome measures are warranted to confirm its educational impact in the Indian medical education context.

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