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Original Research Article

PERCEPTION OF SECOND-YEAR MEDICAL UNDERGRADUATES TO WHITEBOARD TEACHING VS POWERPOINT TEACHING

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ABSTRACT

Background: Lecture delivery in medical education has increasingly shifted from traditional whiteboard teaching to PowerPoint-based presentations. The objective is to compare the perception of second-year medical undergraduates regarding whiteboard teaching versus PowerPoint teaching across key learning domains. **Materials and Methods:** This cross-sectional descriptive study included 100 second-year MBBS students at Medical College Hyderabad from August 2023 to January 2024. A structured questionnaire assessed student preference for whiteboard teaching, PowerPoint teaching, or no significant difference across multiple domains including understanding, engagement, attention, note-taking, recall, pace, and overall learning environment. **Result:** Out of 100 participants, 83% preferred whiteboard teaching overall, 12% preferred PowerPoint, and 5% reported no significant difference. Whiteboard teaching was perceived as superior for conceptual understanding (79%), recall/retention (76%), note-taking (82%), engagement/interaction (84%), attention/focus (81%), and active participation (86%). PowerPoint teaching was mainly preferred for organized/structured delivery (55%) and was comparable to whiteboard for visual appeal (PowerPoint 44% vs whiteboard 52%). **Conclusion:** Second-year medical undergraduates perceived whiteboard teaching as more effective for learning-intensive domains, whereas PowerPoint was favoured primarily for organization and presentation quality. A blended teaching approach combining structured slides with interactive whiteboard explanation may provide the greatest educational benefit.

INTRODUCTION

PowerPoint is a popular presentation software developed by Microsoft, allowing users to create engaging and interactive slideshows, presentations, and reports.[1] A PowerPoint lecture usually consists of a series of slides, each containing text, images, diagrams, charts, or multimedia elements that support the speaker's message.[2] The slides can be designed to be interactive, with features like animations, transitions, and hyperlinks. With its user-friendly interface and versatile features, PowerPoint enables users to design and customize slides with text, images, charts, graphs, and other multimedia elements, making it an essential tool for professionals, educators, and students alike.[3] Medical education has been rapidly reshaped by technology, and lecture delivery has shifted in many institutions from traditional chalk-and-talk methods toward slide-based presentations. PowerPoint-based teaching is now common because it allows organized content delivery, standardized lectures, incorporation of images and videos, and easy sharing of material.[4] However, the increasing reliance on slides has also raised concerns about reduced interaction, passive learning, and limited opportunities for real-time explanation or stepwise concept-building. In contrast, whiteboard teaching remains widely used in medical colleges, particularly for basic and clinical sciences, where diagrams, flowcharts, mechanisms, and problem-solving are central to learning.[5]

Second-year MBBS is an academically demanding phase, as students transition into more concept-dense disciplines such as pathology, pharmacology,

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and microbiology. These subjects are not just "learn and repeat" topics; they require students to understand mechanisms, build mental models, and apply knowledge to clinical patterns. For example, explaining inflammation, hypersensitivity, antimicrobial mechanisms, or drug adverse effects often requires linking multiple steps, drawing pathways, and revisiting concepts repeatedly. In this context, the teaching medium is not a cosmetic choice; it affects how information is processed, how attention is sustained, and how confidently students can reconstruct concepts later during exams or clinical exposure.[6]

Educational psychology highlights that learning is strongly influenced by cognitive load and learner engagement. When students are exposed to dense, rapidly delivered information, working memory can become overwhelmed, reducing comprehension and retention. Slide-based lectures can unintentionally increase this burden when they contain excessive text, multiple images per slide, or are advanced too quickly without pause for explanation.[7] Additionally, if lectures become "read from the slides," students may disengage and shift into passive listening.[8] This can weaken critical thinking and reduce long-term recall. On the other hand, PowerPoint can be extremely effective when used correctly: high-quality histology images, radiological findings, clinical photographs, animated physiological processes, and well-designed flowcharts can improve visualization and understanding, especially for topics that are difficult to imagine through verbal explanation alone.[9]

Whiteboard teaching offers a different learning experience. It is usually slower, progressive, and built in real time, allowing students to follow the thinking process rather than only seeing the final "answer." Many students report that this stepwise approach helps them understand the logic behind diagrams and pathways, and it naturally creates pause points where questions can be asked.[10] The physical act of writing and drawing can also encourage active note-taking, which reinforces learning through rehearsal and personal organization of the material. Whiteboard sessions can feel more interactive, with better eye contact, more spontaneous discussion, and the ability to adapt the lecture based on student confusion or feedback. For medical subjects that rely heavily on conceptual integration, this "build-it-up" style may be particularly supportive.[11] A structured assessment of perception across domains such as conceptual understanding, recall, attention span, interaction, pace of teaching, note-taking facilitation, and overall learning atmosphere can provide actionable insight. Rather than framing this as a competition, such evidence can support a blended approach using PowerPoint for visuals and structure while retaining whiteboard-style stepwise explanation where it improves comprehension.[12]

Objective

To compare the perception of second-year medical undergraduates regarding whiteboard teaching versus PowerPoint teaching across key learning domains.

MATERIALS AND METHODS

This was a cross-sectional descriptive study conducted at Medical College Hyderabad from August 2023 to January 2024. A total of 100 second-year medical undergraduates participated in the study. Non-probability convenience sampling was used to recruit participants. Data were collected using a structured, pre-designed questionnaire comparing perceptions of whiteboard teaching versus PowerPoint teaching. The questionnaire included multiple perception domains such as conceptual understanding, attention, engagement, interaction, pace of lecture, note-taking, recall/retention, and overall learning environment. Each item offered three response options: preference for whiteboard teaching, preference for PowerPoint teaching, or no significant difference. After obtaining informed consent, the questionnaire was distributed to eligible students and completed anonymously. Responses were checked for completeness before entry. Second-year MBBS students who had been exposed to both whiteboard-based and PowerPoint-based teaching during routine lectures and who provided consent to participate were included in the study. Data were entered and analysed using SPSS version 26.0. Categorical variables were presented as frequency and percentage. Preference patterns were summarized overall and domain-wise. Comparisons of proportions (whiteboard vs PowerPoint vs no difference) across items were performed using the Chi-square test where applicable. A p-value <0.05 was considered statistically significant.

RESULTS

Data were collected from 100 participants. A higher proportion of students reported better conceptual understanding with whiteboard teaching compared to PowerPoint (79.0% vs 16.0%), with only 5.0% perceiving no difference. Similarly, whiteboard teaching was favored for improving recall and retention (76.0%), facilitating easier note-taking (82.0%), enhancing engagement and interactivity (84.0%), and improving attention and focus during lectures (81.0%). Whiteboard teaching was also perceived to better promote active participation (86.0%), encourage critical thinking and discussion (78.0%), and create a positive learning environment (80.0%). In contrast, PowerPoint teaching was preferred mainly for better organized and structured delivery, where 55.0% of students favored PowerPoint compared to 41.0% for whiteboard teaching. Visual appeal showed a more balanced

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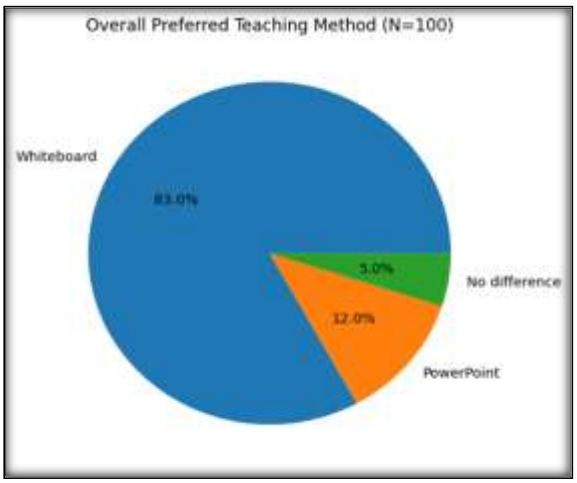
distribution, with 52.0% preferring whiteboard teaching and 44.0% preferring PowerPoint. For summarizing content at the end of lectures, whiteboard teaching remained the preferred method (69.0%), although a notable proportion of students favored PowerPoint (26.0%).

Table 1: Perception of Whiteboard Teaching vs PowerPoint Teaching (N = 100)

Domain	Whiteboard n (%)	PowerPoint n (%)	No significant difference n (%)
Better conceptual understanding	79 (79.0)	16 (16.0)	5 (5.0)
Improves recall/retention	76 (76.0)	19 (19.0)	5 (5.0)
Easier note-taking	82 (82.0)	14 (14.0)	4 (4.0)
More engaging/interactive	84 (84.0)	12 (12.0)	4 (4.0)
Better attention/focus	81 (81.0)	14 (14.0)	5 (5.0)
Better pace to follow	74 (74.0)	21 (21.0)	5 (5.0)
Promotes active participation	86 (86.0)	10 (10.0)	4 (4.0)
Encourages critical thinking/discussion	78 (78.0)	17 (17.0)	5 (5.0)
Creates positive learning environment	80 (80.0)	15 (15.0)	5 (5.0)
Better organized/structured delivery	41 (41.0)	55 (55.0)	4 (4.0)
More visually appealing	52 (52.0)	44 (44.0)	4 (4.0)
Better for summary at end of lecture	69 (69.0)	26 (26.0)	5 (5.0)



For the question on overall learning experience with whiteboard versus PowerPoint teaching, 97 students (97.0%) provided responses, with only 3 (3.0%) missing. The question regarding which teaching method was more interesting and easier to understand had responses from 98 students (98.0%), with 2 (2.0%) missing. Nearly all participants responded to the question comparing PowerPoint visuals with board-drawn diagrams, with 99 responses (99.0%) and only 1 (1.0%) missing. Questions related to teaching pace and conceptual clarity had response rates of 97.0% (97 responses) each, while the question on advantages and disadvantages of both methods had slightly lower but still high completeness, with 95 responses (95.0%) and 5 (5.0%) missing.

Table 2: Open-ended response completeness (N = 100)

Open-ended question statement	Responses received n (%)	Missing n (%)
How did you feel about learning concepts with whiteboard teaching and PowerPoint teaching? Which one did you like better and why?	97 (97.0)	3 (3.0)
Which type of teaching is more interesting and easier for you to understand concepts: whiteboard or PowerPoint? Why?	98 (98.0)	2 (2.0)
Do pictures, charts, and videos in PowerPoint presentations help you more than diagrams drawn on the board? What did you like more and why?	99 (99.0)	1 (1.0)
When thinking about the speed of teaching (pace), which method fits you better: whiteboard or PowerPoint? Explain why.	97 (97.0)	3 (3.0)
What are the main advantages and disadvantages of whiteboard vs PowerPoint, especially for remembering and understanding topics?	95 (95.0)	5 (5.0)
Which method helps you clear confusion better: whiteboard or PowerPoint? Explain with an example if possible.	96 (96.0)	4 (4.0)
Thinking about exams and long-term retention, which method helps you more: whiteboard or PowerPoint? Give examples if you can.	97 (97.0)	3 (3.0)

Whiteboard teaching was significantly favoured for better conceptual understanding (79.0% vs 16.0%; $\chi^2 = 86.42$, $p < 0.001$), improved recall and retention (76.0% vs 19.0%; $\chi^2 = 72.18$, $p < 0.001$), easier note-taking (82.0% vs 14.0%; $\chi^2 = 96.30$, $p < 0.001$), greater engagement and interactivity (84.0% vs 12.0%; $\chi^2 = 102.55$, $p < 0.001$), improved attention and focus (81.0% vs 14.0%; $\chi^2 = 90.47$, $p < 0.001$), better pace to follow (74.0% vs 21.0%; $\chi^2 = 64.08$, $p < 0.001$), promotion of active participation (86.0% vs 10.0%; $\chi^2 = 112.76$, $p < 0.001$), encouragement of critical thinking and discussion (78.0% vs 17.0%; $\chi^2 = 78.94$, $p < 0.001$), creation of a positive learning environment (80.0% vs 15.0%; $\chi^2 = 88.65$, $p < 0.001$), and effectiveness in summarizing content at the end of lectures (69.0% vs 26.0%; $\chi^2 = 54.61$, $p < 0.001$). In contrast, PowerPoint teaching was significantly preferred only for organized and structured delivery (55.0% vs 41.0%; $\chi^2 = 6.38$, $p = 0.041$), while no statistically significant difference was observed

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between the two methods for visual appeal (52.0% vs 44.0%; $\chi^2 = 1.72$, $p = 0.423$).

Table 3: Statistical Analysis of Perception Domains Comparing Whiteboard and PowerPoint Teaching (N = 100)

Domain	Whiteboard n (%)	PowerPoint n (%)	No difference n (%)	χ^2 value	p-value
Better conceptual understanding	79 (79.0)	16 (16.0)	5 (5.0)	86.42	<0.001
Improves recall/retention	76 (76.0)	19 (19.0)	5 (5.0)	72.18	<0.001
Easier note-taking	82 (82.0)	14 (14.0)	4 (4.0)	96.30	<0.001
More engaging/interactive	84 (84.0)	12 (12.0)	4 (4.0)	102.55	<0.001
Better attention/focus	81 (81.0)	14 (14.0)	5 (5.0)	90.47	<0.001
Better pace to follow	74 (74.0)	21 (21.0)	5 (5.0)	64.08	<0.001
Promotes active participation	86 (86.0)	10 (10.0)	4 (4.0)	112.76	<0.001
Encourages critical thinking/discussion	78 (78.0)	17 (17.0)	5 (5.0)	78.94	<0.001
Creates positive learning environment	80 (80.0)	15 (15.0)	5 (5.0)	88.65	<0.001
Better organized/structured delivery	41 (41.0)	55 (55.0)	4 (4.0)	6.38	0.041
More visually appealing	52 (52.0)	44 (44.0)	4 (4.0)	1.72	0.423
Better for summary at end of lecture	69 (69.0)	26 (26.0)	5 (5.0)	54.61	<0.001

DISCUSSION

This study assessed the perceptions of second-year medical undergraduates regarding whiteboard teaching versus PowerPoint teaching across multiple learning and classroom experience domains. Overall, students showed a strong preference for whiteboard teaching in most items, particularly those linked with conceptual clarity, engagement, attention, and active participation. In contrast, PowerPoint teaching was mainly preferred for structured presentation and visual appeal. These findings suggest that while technology-assisted lectures can enhance organization and visual delivery, students still value the stepwise, interactive nature of board-based teaching for understanding-heavy medical content. A consistent pattern in the domain-wise findings was that whiteboard teaching was perceived as superior for deep understanding, note-taking, attention maintenance, and active learning. This makes sense: when a teacher builds a diagram or concept gradually on the board, it forces an instructional pace that is easier to follow and gives students time to process, question, and consolidate information.[13] It also naturally supports note-taking, which is a key learning behaviour in the second year MBBS, where students are expected to convert lectures into exam-ready material. The high preference for whiteboard in "active learning/participation" and "maintaining focus" implies that board teaching may foster a more interactive classroom environment and reduce passive learning. In medical education, this matter because conceptual integration rather than memorization alone is essential for subjects like pathology and pharmacology.[14]

PowerPoint teaching was most commonly preferred for "organized/structured delivery" and was competitively rated for "visual appeal." This is also logical because slides provide a clean layout, allow sequencing of content, and enable inclusion of high-quality images such as histology slides, clinical photographs, radiology, and animations. Students may perceive slide teaching as more polished and time-efficient. However, this advantage may not translate into better understanding if lecture delivery becomes too fast, too dense, or overly text-heavy. In many real classrooms, a "slide-driven" approach can reduce interaction and shift students into passive listening.[15] The present results indirectly support this concern, as PowerPoint was less preferred in engagement- and comprehension-related domains. An important interpretation of these findings is that students are not rejecting PowerPoint; they are rejecting poorly implemented PowerPoint.[16] When slides are used as a script rather than a support tool, or when content is rushed, student comprehension and retention may fall. Meanwhile, whiteboard teaching, by design, slows delivery, highlights key steps, and allows spontaneous clarification. This may be particularly effective for second-year students who are still building foundational frameworks and often struggle when too much information is presented without a clear narrative. Therefore, teaching effectiveness here appears to be more about the learning process (interactive, paced, stepwise explanation) than the medium itself. From an educational planning perspective, the results favour a blended approach.[17] Whiteboard teaching seems ideal for mechanism-based explanations, flowcharts, pathways, and concept-building, while PowerPoint is valuable for structured outlines and image-heavy content. A practical "best of both worlds" approach would be using PowerPoint for visuals and overall structure, while using the board for progressive explanation, problem-solving, and student interaction.[18] This can also address time constraints and ensure that core concepts are delivered clearly while still allowing exposure to essential visual learning material.

Limitations

The study relied on perception-based responses, which reflect student experience rather than objective academic outcomes. It was conducted in a single student cohort, so perceptions may differ in other institutions or academic years. Additionally,

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the effectiveness of each method can vary depending on teacher skill, lecture design, and class size, which were not controlled. Despite these limitations, the findings provide useful insight into what students believe supports their learning during a concept-intensive academic year.

CONCLUSION

It is concluded that second-year medical undergraduates perceived whiteboard teaching as more effective than PowerPoint teaching for most learning domains, particularly for conceptual understanding, maintaining attention, encouraging active participation, and facilitating note-taking and recall. PowerPoint teaching was mainly viewed as advantageous for structured, well-organized delivery and visual appeal. Overall, the findings support adopting a blended teaching approach in which PowerPoint is used for high-quality visuals and organization, while whiteboard teaching is used for stepwise explanation and interactive concept-building to optimize student learning.

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