

The Impact of Digital Integration on Attention and Engagement in Optometry Education: A Student Perspective

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DOI: <https://dx.doi.org/10.51584/IJRIAS.2025.10100000119>

Received: 10 October 2025; Accepted: 16 October 2025; Published: 12 November 2025

ABSTRACT

The increasing incorporation of digital technologies is fundamentally reshaping optometry education. This paper investigates the effects of this digital shift on undergraduate optometry students' attention spans and engagement levels, drawing directly from their experiences. Employing a mixed-methods approach, we analyzed qualitative and quantitative feedback from students, revealing that while digital platforms enhance accessibility and interactivity, they also present challenges to sustained attention. The study highlights the significant role of practical learning, visual aids, and opportunities for self-directed feedback in maintaining student concentration. Based on these findings, we propose recommendations for the future evolution of the optometry curriculum.

INTRODUCTION

Optometry education, a field that necessitates a strong foundation in both theoretical knowledge and practical clinical skills, is undergoing a substantial digital transformation. The rapid transition to digital platforms, particularly accelerated by recent global events, has introduced novel learning opportunities. However, this shift has also sparked concerns regarding student engagement, notably the ability to maintain focus during digitally delivered instruction. This research delves into these dynamics, specifically examining them through the lens of undergraduate optometry students' perceptions and experiences. The importance of clinical skills and competency development in optometry education, even amidst digital advancements, is well-documented, especially in contexts where resources may be limited ([1]).

Objectives

This study aimed to:

- Determine the preferred learning methodologies among optometry students within a digitally enriched educational environment.
- Evaluate the self-reported attention spans of students during digital and hybrid learning sessions.
- Identify correlations between different types of learning content and the level of student engagement.
- Gather student insights and suggestions for the enhancement of current teaching practices.

METHODOLOGY

Sample: The study involved 32 undergraduate students enrolled in an optometry program.

Instrument: A structured questionnaire was administered via Google Forms to collect data.

Data Collection: The questionnaire gathered information on demographics (gender, semester), preferred learning methods (theory and practical), engagement with various content formats, frequency of digital tool usage, self-assessed attention span during lectures, satisfaction with current teaching methods, and open-ended suggestions for improvement.

Key Findings

Preferred Learning Methods:

- **Theory:** Students indicated a strong preference for live classroom lectures, interactive discussions, and instructor-provided notes. This aligns with the value placed on direct interaction and expert guidance, even in a digital age.
- **Practical:** A significant majority of students favored self-practice opportunities coupled with constructive feedback and hands-on demonstrations, underscoring the critical importance of experiential learning in optometry. This finding is consistent with the emphasis on practical training and clinical exposure in optometry education, as highlighted in studies conducted in various settings, including those with limited resources ([1]).

Content Presentation and Engagement:

- Approximately 65% of students reported that visual content, such as videos and infographics, was the most engaging format. This highlights the potential of multimedia resources to capture and maintain student interest in digital environments.
- Students in later semesters showed a heightened preference for kinesthetic learning activities, suggesting that as students progress and their clinical understanding deepens, active involvement becomes increasingly important for their learning.

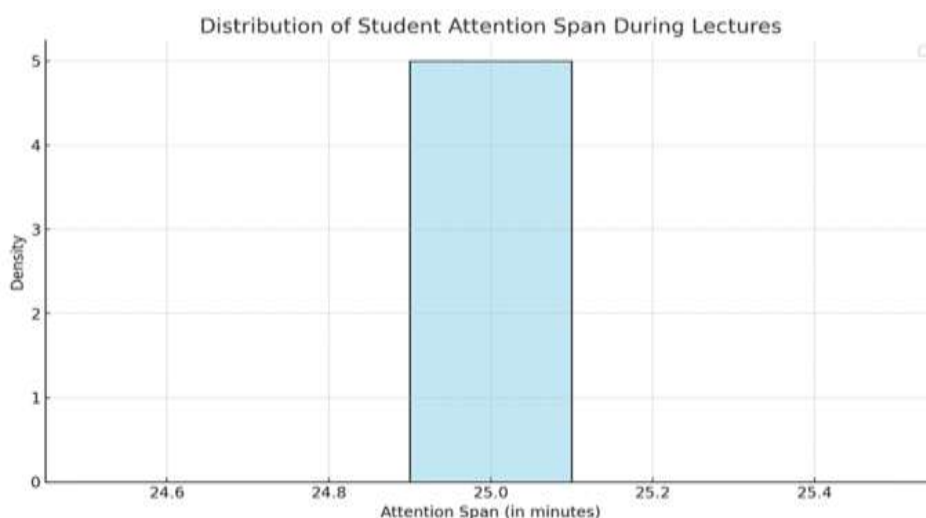
Attention Span:

The majority of students reported an average attention span of 20–30 minutes during lectures. This self-reported duration is consistent with contemporary research suggesting a general shortening of attention spans in digitally mediated environments.

A Gaussian curve, also known as a normal distribution, is often used to represent data that clusters around a central value. In this case, the x-axis represents the attention span in minutes, and the y-axis represents the frequency or density of students reporting that attention span. The peak of the curve indicates the most common attention span, while the spread of the curve indicates the variability in attention spans across the student sample. A narrow curve would indicate that most students have similar attention spans, while a wider curve would suggest greater variability.

The shape of the Gaussian curve is symmetrical, with the mean, median, and mode being equal. The "tails" of the curve extend indefinitely in both directions, but the area under the curve represents the total probability (which equals 1).

Figure 1: Distribution of Student Attention Spans During Lectures



The provided graph (Figure 1) visually represents this distribution, with a normal distribution curve peaking within the 20-30 minute range and a slight left skew indicating a notable proportion of students experiencing even shorter attention spans.

Digital Tool Usag

- Students who reported using digital platforms like YouTube, Digicampus, and specialized optometry applications 3–4 times per week indicated higher levels of engagement. This suggests a positive correlation between regular, purposeful use of digital resources and student involvement.
- A subset of students reported using digital tools "rarely," indicating variability in the adoption and integration of technology into their learning practices.

Satisfaction and Suggestions:

- Student satisfaction with current teaching methodologies was mixed, with a considerable number expressing neutral or negative sentiments. This highlights areas needing improvement in the delivery of optometry education in the digital era.
- Open-ended feedback consistently emphasized the following needs:
 - Increased opportunities for practical demonstrations, reinforcing the importance of visual and kinesthetic learning.
 - More interactive and project-based learning activities to foster deeper engagement and active participation, aligning with the principles of active learning strategies that enhance student understanding ([2]).
 - Enhanced clarity in theoretical instruction, with a stronger emphasis on connecting theoretical concepts to real-world clinical applications. This underscores the need for pedagogical approaches that bridge the gap between theory and practice, a key aspect of effective evidence-based practice education ([3]).

DISCUSSION

The graph above shows the **distribution of student attention spans** during lectures, with a Gaussian (normal) distribution curve fitted over the histogram.

Explanation of the Data Distribution:

- The **x-axis** represents attention span in minutes (using midpoint values for ranges).
- The **y-axis** indicates the density, showing how common each attention span range is among students.
- The **Gaussian (KDE) curve** overlays the histogram to highlight the central tendency and spread of data.

Insights from the Curve:

- The curve peaks around **20–30 minutes**, showing most students report that as their average attention span.
- There's a slight **left skew**, indicating a notable number of students also report shorter attention spans (10–20 minutes or less).
- Very few students report **attention spans exceeding 40 minutes**, as seen from the low right tail.

The attention span data indicates that while digital tools enrich learning, they may also fragment concentration. This supports the hypothesis that **digitally enriched environments require restructured lesson durations and engagement strategies**.

Practical application remains a stronghold of effective learning. Visual and kinesthetic tools bridge attention gaps and allow conceptual anchoring. However, students' responses reveal a gap between the technology's potential and its implementation, suggesting the need for faculty development in digital pedagogy.

CONCLUSION

The integration of digital technologies is undeniably transforming the landscape of optometry education and the ways in which students interact with learning materials. While digital platforms offer significant advantages in terms of accessibility and potential for engagement, careful consideration must be given to the impact on student attention spans and the continued importance of practical experience. Students' feedback advocates for a balanced, blended approach that synergistically combines the richness of digital resources with hands-on, real-world training.

RECOMMENDATIONS

Based on the study's findings, we propose the following recommendations for enhancing optometry education in the digital age:

- **Micro-learning modules:** Divide lengthy lectures into shorter, focused segments of approximately 20 minutes to better align with students' reported attention spans.
- **Active learning integration:** Incorporate interactive elements such as quizzes, polls, and reflection prompts within digital learning sessions to actively involve students and maintain their focus.
- **Digital-practical blending:** Strategically combine recorded demonstrations of clinical skills with opportunities for live, supervised practice to bridge the gap between theoretical knowledge and practical application.
- **Faculty training in digital pedagogy:** Invest in professional development opportunities for educators to enhance their skills in utilizing interactive digital platforms and implementing effective online teaching strategies.
- **Routine student feedback mechanisms:** Establish regular channels for students to provide feedback on teaching methodologies and digital resources, allowing for continuous improvement and adaptation of the curriculum to meet their needs.

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