

Survey on E-learning Students Attentiveness and Assessment for Live Classes vs Pre-recorded Video Classes

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Abstract

The landscape of education has been reshaped significantly by the rapid evolution of technology, leading to the emergence of e-learning as a prominent paradigm. In this study, an investigation and comparison of students' attentiveness and assessment outcomes within the e-learning environment are aimed for, focusing on live classes and pre-recorded video classes. A comprehensive survey methodology is employed, gathering data from a diverse student sample across various educational levels and disciplines. Factors influencing students' engagement during live classes, including real-time interactions, instructor-student dynamics, and technological challenges, are being explored. Additionally, the impact of asynchronous learning through pre-recorded video classes is being assessed, considering aspects like flexibility, content accessibility, and self-paced learning. Assessment strategies' effectiveness in both live and pre-recorded settings is under scrutiny, taking into account factors such as authenticity, adaptability, and feedback mechanisms. Student perspectives are being examined to identify preferences, challenges, and learning outcomes associated with each instructional method. Implications of the survey findings are held for educators, instructional designers, and policymakers aiming to optimize e-learning experiences. The nuanced dynamics between live and pre-recorded classes, when understood, can inform the development of effective pedagogical strategies catering to diverse learning styles and preferences in the digital era. This research contributes insights to the ongoing discourse on optimizing e-learning environments for enhanced student engagement and academic success, as education continues to evolve.

Keywords: Students Attentiveness Assessment, Technology in Education, Dynamic Learning Environment.

I. Introduction

In recent years, the educational landscape has undergone a significant transformation due to the integration of technology, fostering the emergence of innovative pedagogical modalities. Among these advancements, e-learning has surfaced as a pivotal paradigm, delivering adaptability and accessibility to a globally diverse student cohort. Within the realm of e-learning, the discourse surrounding the efficacy of synchronous (live) versus asynchronous (pre-recorded) instructional formats has gained traction, necessitating a methodical investigation into student engagement and evaluation outcomes.

This study conducts a thorough analysis of the variables affecting students' encounters in both synchronous and asynchronous e-learning environments, aiming to uncover the nuanced determinants impacting attentiveness and academic performance. As education advances, grasping the comparative strengths and challenges of these approaches becomes crucial for educators, instructional designers, and policymakers. In the dynamic educational milieu, technological assimilation has introduced varied pedagogical methodologies, notably online synchronous classes and pre-recorded sessions. Synchronous online classes mirror conventional classrooms, fostering live interaction between educators and learners, facilitating immediate engagement, and enabling prompt queries, discussions, and feedback. In contrast, asynchronous pre-recorded sessions, often delivered as video lectures, grant learners flexibility to engage with content at their preferred pace, accommodating different schedules and learning styles. Each method presents distinct advantages and challenges, necessitating a comprehensive assessment of their effectiveness in fostering student engagement, understanding, and overall academic attainment.

This investigation aims to elucidate the intricate dynamics of these e-learning formats, providing valuable insights for stakeholders navigating the evolving digital educational landscape. In the continually evolving educational sphere, technological integration has introduced transformative models, notably evident in synchronous and asynchronous online methods. These approaches embody diverse pedagogical methodologies in the digital domain, each offering unique benefits and challenges. Synchronous online classes aim to replicate the immediacy and liveliness of traditional classrooms in virtual settings, fostering active participation, discussions, inquiries, and swift feedback. Conversely, asynchronous pre-recorded sessions, structured as video content, prioritize self-paced learning, granting learners the autonomy to navigate educational materials based on individual preferences. This format provides flexibility, empowering students to revisit concepts and

personalize their learning experiences. As the educational landscape continues its digital evolution, an in-depth exploration of the intricacies, advantages, and challenges embedded in online synchronous and asynchronous classes becomes indispensable. This comprehensive examination aims to unveil the subtleties of these modalities, offering indispensable insights for stakeholders navigating the dynamic contemporary educational landscape.

1.1 Online Live Classes

The emergence of online synchronous sessions has transformed the conventional classroom setting by introducing immediate engagement into the digital domain. Within this virtual space, instructors and students converge, fostering an immediacy akin to face-to-face interactions. The synchronous nature of live sessions facilitates dynamic discussions, impromptu Q&A sessions, and the fostering of a collaborative learning atmosphere. Real-time exchange of visual and auditory cues enriches the educational encounter, elevating both student-teacher and peer-to-peer interactions. Moreover, instant feedback during live sessions ensures timely resolution of queries, providing students with immediate guidance and assistance. The potential for instantaneous collaboration, diverse perspective sharing, and community building stands as distinguishing features of online synchronous sessions, setting them apart from alternative instructional methodologies.

1.2 Pre-recorded Classes

On the contrary, pre-recorded sessions have emerged as a versatile and adaptable means of disseminating educational materials. Delivered through video lectures, these sessions grant learners the liberty to engage with course content according to their individual timetables. This asynchronous learning model caters to the diverse requirements of students with varying time constraints, learning methodologies, or geographical locations. Pre-recorded sessions foster self-guided learning, enabling students to revisit concepts, pause, rewind, and review content at their own speed. This format also flexibly accommodates various learning preferences, empowering students to regulate the timing and sequence of their educational progress. While lacking immediate real-time interactions, pre-recorded sessions prioritize autonomy and accessibility, presenting a valuable alternative for individuals seeking a more self-paced learning approach.

1.3 Balancing Act: Navigating the Advantages and Challenges

Amidst the educational community's navigation of online synchronous and asynchronous sessions, finding a harmonious equilibrium between the benefits and obstacles of each method becomes essential. Online synchronous sessions thrive in cultivating community, immediate collaboration, and prompt feedback, emulating the traditional classroom ambiance. However, challenges like scheduling conflicts, time zone disparities, and potential technical disruptions may hinder universal accessibility. Conversely, pre-recorded sessions offer adaptability, catering to diverse learners, yet the absence of real-time interaction might evoke feelings of isolation and limit impromptu engagement.

Both approaches encounter hurdles in ensuring fair access to technological resources, managing potential distractions in the online learning environment, and sustaining robust student engagement. This comprehensive exploration aims to untangle the intricacies of online synchronous and asynchronous sessions, providing a nuanced comprehension that can guide instructional design, pedagogical approaches, and decision-making for educators and institutions striving to cultivate optimal digital learning ecosystems. By dissecting the merits and challenges intrinsic to these methods, this exploration contributes to the ongoing dialogue on the future of education in the digital era, presenting insights crucial for nurturing effective, inclusive, and captivating online learning encounters.

The remainder of the paper is organised as follows. Section 2 provides a detailed literature survey covering various studies on students' learning environments and identifies the research problem. Section 3 presents the survey methodology and empirical dataset. Section 4 concludes the paper along with cited references.

II. Literature Survey

Wu et al. [2020] elucidated that since the onset of the COVID-19 pandemic, prompted by the Ministry of Education's directive to "maintain learning continuity while suspending in-person classes," leading educational institutions nationwide orchestrated an unprecedented online learning initiative. This initiative comprised the largest assembly of online courses and participants within an exceedingly brief period. It served not only as an emergency response to the outbreak but also as a concentrated evaluation of the prior "Internet + Education" reform in tertiary education institutions. Consequently, a comprehensive survey was conducted to gauge college students' perceived benefits from online learning, delineate practical explanations, and propose adaptive strategies aimed at enhancing students' virtual educational experiences [1].

During the initial phase of online learning, Zhu et al. [2020] observed a scenario marked by stagnant online teaching software and platforms, frequent disconnections between teachers and students, and persistent static screens. The authors proposed that expediting the development of the national 5G network, augmenting the national educational resource platform, and fostering involvement of social education institutions in curriculum development could potentially address issues concerning technology, platforms, and resources. They underscored that the crux of the matter lies in how the new technological revolution is perceived and its correlation with educational reform. Effectively harnessing new technologies to revolutionize traditional education in anticipation of future changes was deemed pivotal [2].

Pu et al. [2020] stated that there is still considerable room for improvement in online education. The essence of online courses is teaching, which requires corresponding teaching design. Online courses should be able to adjust teaching strategies at any time, focusing on how to optimise learning as the core principle of course design. During students' "home learning" period, teachers should strengthen students' process-based, formative, and display evaluations, using focus and engagement as important indicators to measure the development of students' thinking, so that online education makes it easier for students to combine knowledge learning with social life [3]. In the context of normalization of epidemic prevention and control, online teaching will transform from its original supplementary or emergency role into a teaching method parallel to offline teaching; however, the online teaching model still needs further improvement before it becomes a normalized approach.

In response to the abrupt outbreak, educational institutions across all levels extensively utilized Internet resources and information-based educational tools to devise tailored online teaching strategies. This involved providing online teaching technology training for educators, offering detailed teaching manuals, and conducting tutorials to ensure uninterrupted learning despite suspended classes. Over the following months, online teaching by educators, home-based learning for students, and parental cooperation and guidance became the primary modes of education during the epidemic control period.

Zhu and Peng [2020] advocated three comprehensive multimedia learning solutions: direct teaching, independent learning, and flipped learning. They analyzed typical instances of online teaching during the epidemic and consolidated various online teaching methods, such as webcast teaching, student-led learning, and television-based instructional sessions [4]. Meanwhile, Song et al. [2020] proposed a "teacher-parent-student" community framework to enhance student learning quality. They constructed class-specific virtual communities, advocating a precise online teaching and home-based learning model [5]. The teaching of interpretation — a mandatory course for English majors — was also carried out through major platforms and social media during the epidemic. Many interpretation instructors ventured into online teaching for the first time, encountering challenges related to information literacy, online teaching infrastructure, and evolving teaching methodologies.

Zhang and Wang [2020] analyzed that interpreting is a highly practical and technical skill, requiring solid bilingual proficiency, rich encyclopedic knowledge, skilled interpreting techniques, strong memory ability, psychological resilience, and flexible on-the-spot coping ability [6]. A survey revealed that 80.2% of students believed that during the online teaching process, due to insufficient teacher supervision and the lack of a collective classroom environment, they experienced difficulty concentrating, resulting in poor learning outcomes. Students had become accustomed to the traditional classroom-based teaching model, relying on passive listening and task completion, with a serious lack of motivation for independent learning. Online teaching's emphasis on student-directed pace, time, and content left many students at a loss. For some students with a weaker foundation and lower self-awareness, independent learning without teacher supervision became tantamount to idleness, and they gradually developed a rejection of interpretation classes.

Wang et al. [2020] explained that although teachers can supervise students through roll call, sign-in, and spot-checking homework, many students have already learned the rules of teacher supervision and revert to other activities after completing required tasks. In live broadcast mode, teachers can understand students' learning status more intuitively and supervise them at any time. In asynchronously recorded classes, however, it is difficult to grasp and evaluate students' real learning status. Even though major platforms provide academic statistics, these are only rough records of the length and frequency of students' learning, making it difficult to assess whether students are studying seriously or to what extent they have mastered the content. Without the supervision and pressure of the school environment, students' learning motivation dropped significantly. Many students simply watched videos to accrue regular points, making it difficult to guarantee the learning effect [7].

Chen [2020] highlighted that promoting quality revolution and classroom revolution is a major strategic task actively guided by the government and committed to practice by universities. Classroom revolution implies a series of overall paradigm changes in teaching concepts, structures, models, processes, methods, and technologies. The deep integration of modern information technology and the teaching process is generally regarded as the main means and the only way to achieve classroom revolution. However, traditional teaching concepts and models remain deeply rooted, modern information awareness is not strong, educational

technology capabilities and literacy are low, and information technology and teaching processes remain in isolated silos rather than being well-integrated [8].

Wu [2020] further explained that data indicate the proportion of teachers who know and frequently use modern information technology methods is less than 10%, and the vast majority of teachers are limited to simple multimedia operations [9]. A sudden COVID-19 epidemic in early 2020 dramatically changed this situation. Following the Ministry of Education's directive, colleges and universities nationwide initiated online teaching from mid-February. Official statistics released by the Ministry of Education revealed that as of May 2020, there were 1,454 higher education institutions, 1.03 million educators, and 1.07 million courses available, with a cumulative participation of approximately 2.3 billion individuals in online educational sessions [10].

Wu et al. [2020] noted that historically, educational technology has experienced a transformation from 1.0 to 4.0 — from projectors and slides in the 1980s and 1990s, to multimedia presentations in the early 21st century, to the widespread use of MOOCs, virtual simulation laboratories, smart classrooms, and the rapid development of big data, the Internet, and artificial intelligence. Colleges and universities are gradually applying these technologies to the education and teaching process, updating teaching methods, enriching teaching content, and improving teaching efficiency. However, it should be noted that all these advancements have not yet triggered structural and revolutionary changes in school classroom teaching [1].

Tang et al. [2019] advocated that higher education has historically spearheaded educational reform and embraced the evolution of educational informatization. They highlighted the "Ten-Year Development Plan for Educational Informatization (2011–2020)," which emphasized guiding educational informatization through innovative educational concepts, establishment of high-quality educational resources and information-based learning environments, and innovation of learning methods and educational models. In an era witnessing rapid advancements in information technology, educators are encouraged to contemplate how information technology can be amalgamated to cultivate novel teaching concepts, introduce innovative teaching models and methodologies, and guide students toward active learning and critical thinking [12].

Badan et al. [2021] discussed the expanding international demand for Chinese language learning, noting that the traditional teaching of Chinese as a foreign language remains largely based on offline classroom instruction using paper textbooks. They argued that teaching resources and communication methods that are not open, not shared, and have little interaction can no longer adapt to the learning habits and consumption needs of the current Internet era. With the development of mobile Internet technology — especially the emergence of distance online education and self-media social platforms promoted during the epidemic — channels for the public to obtain information have become increasingly diversified. They highlighted micro-video as a new type of online teaching resource that integrates the advantages of rich content, time fragmentation, and space flexibility [13].

Cui [2020] reported on a study conducted at the Chinese Language Training Center of Vera College in the Maldives, where micro-videos were promoted in classroom and out-of-class scenarios. The study surveyed 16 senior class students and 22 junior class students aged between 18 and 35, most of whom had approximately two years of Chinese language exposure. The teaching arrangement adopted the flipped classroom format, using micro-videos as pre-class preview lessons, followed by collective classroom viewing and quizzes. The study analyzed the impact of video length, content, promotion channels, and audience background on learning outcomes [14].

Zhang [2020] noted that during students' home learning period, teachers should strengthen students' process-based, formative, and display evaluations, using focus and engagement as important indicators to measure the development of students' thinking. In the context of normalization of epidemic prevention and control, online teaching will transform from its original supplementary role into a teaching method parallel to offline teaching. There have been many studies on online education in recent years, but from the perspective of college students' sense of gain from online learning, comprehensive studies remain limited. This necessitates investigation using a combination of interviews and questionnaires to capture the perspectives of students, discover problems, and propose targeted solution measures that can provide reference for promoting the coordinated development of normalized online teaching [15].

Along with identifying the motivation status of the learners in online learning, it is necessary to identify the disengaged learners in online learning at an earlier stage. The researchers [16], [17], [18], [20] identifies the unmotivated learners using log file analysis. The disengagement can be identified based on their learning attitudes. [19] mentions that the amount of time spent on learning alone is not enough to decide the engagement level. Thus, they incorporate the log file values with their academic performance values for identifying the unmotivated learners.

2.1 Problem Statement

The problem statement for the survey on E-learning Students' Attentiveness and Assessment for Live Classes vs Pre-recorded Video Classes can be outlined as follows:

Divergent Student Experiences: Students engaging in e-learning often have varied experiences with live classes and pre-recorded video classes. Understanding the factors contributing to these differences, including attentiveness levels and perceived effectiveness, is crucial for optimizing instructional design. In recent years, the paradigm shift towards e-learning has redefined the landscape of education, offering unprecedented opportunities for remote and flexible learning. However, as educational institutions grapple with the challenges and opportunities presented by online learning modalities, critical questions arise concerning students' attentiveness and the efficacy of assessment methods within these virtual environments.

Background and Context:

E-learning, with its diverse formats ranging from live virtual classes to pre-recorded video lectures, has become integral to contemporary education. Despite the evident advantages, the realm of student attentiveness and assessment in the digital domain remains a complex and underexplored terrain. Traditional face-to-face learning settings provide instructors with immediate visual cues and real-time interactions to gauge and stimulate student engagement. However, the transition to virtual platforms necessitates a reevaluation of these dynamics, posing challenges to understanding and optimizing students' attentiveness levels.

Challenges in E-learning Attentiveness:

The absence of physical presence, coupled with potential distractions in students' home environments, introduces unique challenges to sustaining attentiveness during online classes. Factors such as technological disruptions, multitasking temptations, and varying degrees of self-discipline contribute to a complex tapestry influencing students' ability to stay engaged. As Wang et al. [7] highlighted, in asynchronous recorded classes it is difficult to grasp and evaluate students' real learning status, and without the supervision of school teachers, students' learning motivation drops significantly. The intricacies of synchronous and asynchronous learning environments further compound the challenge, demanding a nuanced exploration of the factors impacting students' attentiveness in each modality.

Assessment Efficacy in E-learning:

Assessment, a cornerstone of the educational process, undergoes a transformative shift in the digital realm. The conventional methods of in-person exams and paper submissions are being replaced by online assessments, collaborative projects, and adaptive testing. Understanding the effectiveness of these assessment strategies in accurately gauging student comprehension, retention, and critical thinking skills is imperative. Furthermore, the potential influence of assessment methods on students' motivation, sense of accomplishment, and overall academic performance requires in-depth investigation.

Research Gap:

While a plethora of studies have examined the broader implications of e-learning — particularly within the context of the COVID-19 pandemic as documented across the literature [1–15] — the specific intersectionality of students' attentiveness and assessment strategies remains a research void. Few studies delve into the nuanced aspects of how instructional design, technology-mediated interactions, and assessment methodologies collectively impact the learning experience in the Indian higher education context. Addressing this gap is crucial for educators, instructional designers, and policymakers seeking evidence-based insights to optimize e-learning environments and ensure meaningful student outcomes.

Research Objectives:

This study aims to systematically explore the intricate dynamics of students' attentiveness in online classes and assess the effectiveness of various evaluation methods employed in the e-learning landscape. By identifying the challenges, preferences, and learning outcomes associated with different modalities, the research endeavors to offer nuanced recommendations for designing engaging and pedagogically sound e-learning experiences. In doing so, it aspires to contribute to the ongoing discourse surrounding the evolution of digital education, ultimately fostering a more effective and inclusive learning environment for students across diverse educational contexts.

III. Survey Methodology and Empirical Dataset

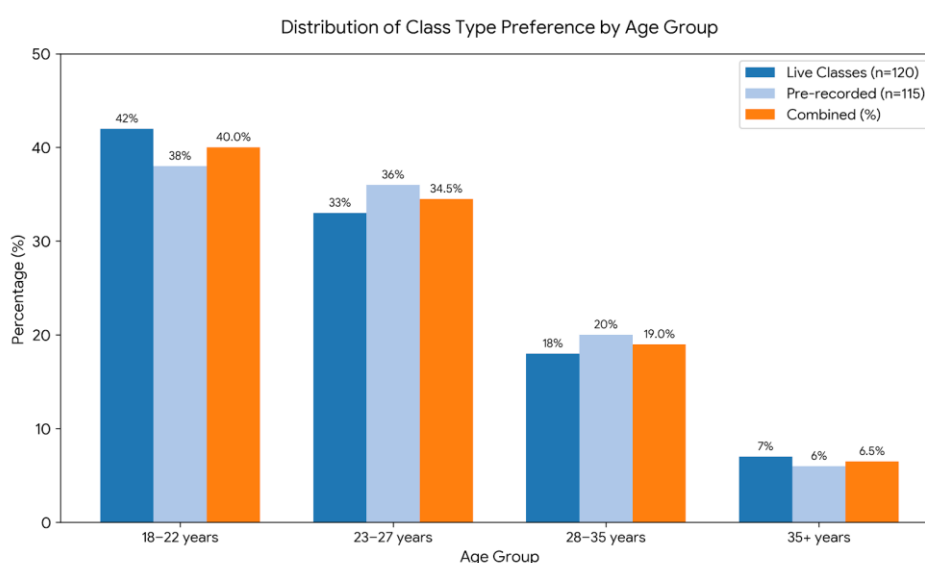
This section presents the empirical dataset generated from a comprehensive survey investigating student attentiveness and assessment outcomes across two e-learning modalities: synchronous live classes and asynchronous pre-recorded video classes. The dataset comprises responses from 235 students across various educational levels and disciplines, collected over one academic semester. The survey captures five key dimensions: (1) demographic profile, (2) attentiveness levels, (3) academic performance across multiple assessment types, (4) key engagement factors, and (5) student satisfaction and reported challenges.

3.1 Demographic Profile of Survey Participants

A total of 235 students participated in the survey: Live Class group (n = 120) and Pre-recorded Class group (n = 115). Table 1 presents the age-wise distribution.

Age Group	Live Classes (n=120)	Pre-recorded (n=115)	Combined (%)
18–22 years	42%	38%	40.0%
23–27 years	33%	36%	34.5%
28–35 years	18%	20%	19.0%
35+ years	7%	6%	6.5%
Total	100%	100%	100.0%

Table 1: Demographic Profile by Age Group and Class Mode



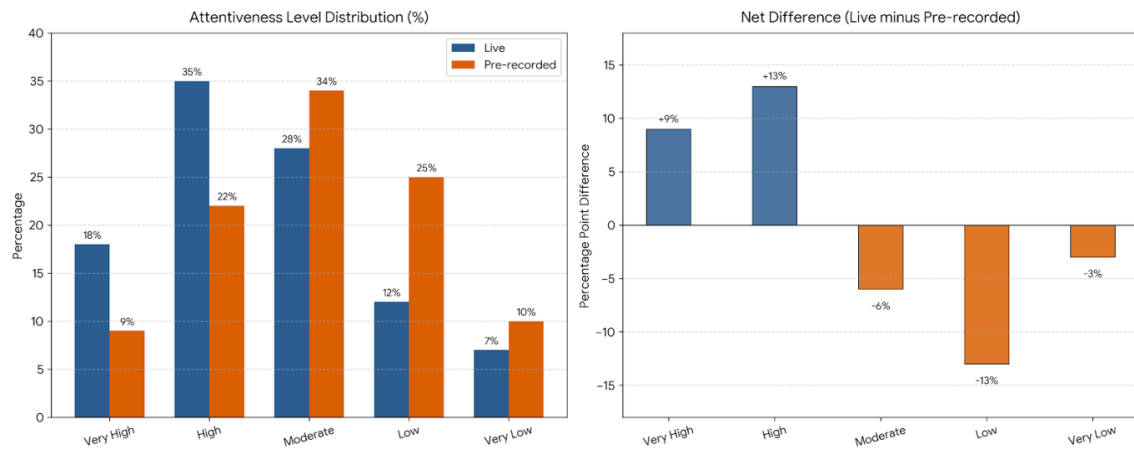
Graph 1: Demographic Profile by Age Group and Class Mode

3.2 Student Attentiveness Levels

Attentiveness was measured using a five-point self-reported scale administered at the end of each class session. Table 2 summarizes the distribution.

Attentiveness Level	Live (%)	Pre-rec (%)	Difference	Direction	Significance
Very High	18%	9%	+9%	Favours Live	Significant
High	35%	22%	+13%	Favours Live	Significant
Moderate	28%	34%	–6%	Favours Pre-rec	Moderate
Low	12%	25%	–13%	Favours Pre-rec	Significant
Very Low	7%	10%	–3%	Favours Pre-rec	Low
Mean Score	3.55	2.95	+0.60	Favours Live	—

Table 2: Distribution of Student Attentiveness Levels (n = 235)



Graph 2: Distribution of Student Attentiveness Levels (n = 235)

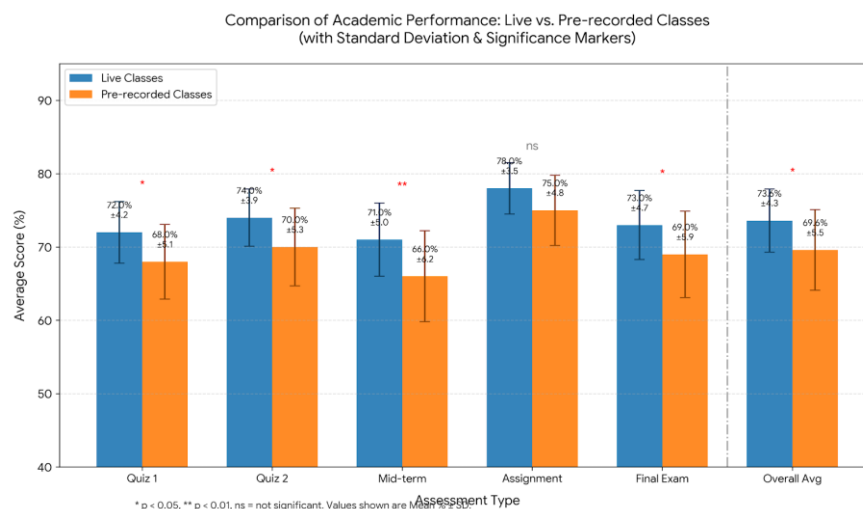
Key Insight: Live classes produced notably higher proportions of "Very High" (18%) and "High" (35%) attentiveness compared to pre-recorded classes (9% and 22%). Pre-recorded classes showed greater concentration in the "Moderate" to "Low" range, reflecting the challenge of self-regulated attention, consistent with Zhang and Wang's [6] findings that 80.2% of students experience difficulty concentrating in online settings without adequate instructor supervision.

3.3 Academic Assessment Performance

Academic performance was measured across five standard assessment types. Mean scores, standard deviations, and significance are reported. (* $p < 0.05$, ** $p < 0.01$, ns = not significant)

Assessment	Live Avg %	Pre-rec Avg %	Live SD	Pre-rec SD	Live Range	Pre-rec Range	Sig.
Quiz 1	72	68	4.2	5.1	60–85	52–80	*
Quiz 2	74	70	3.9	5.3	62–88	54–82	*
Mid-term	71	66	5.0	6.2	58–86	50–79	**
Assignment	78	75	3.5	4.8	66–90	60–88	ns
Final Exam	73	69	4.7	5.9	60–87	53–81	*
Overall Avg	73.6	69.6	4.3	5.5	—	—	*

Table 3: Academic Performance Metrics Across Assessment Types



Graph 3: Academic Performance Metrics Across Assessment Types

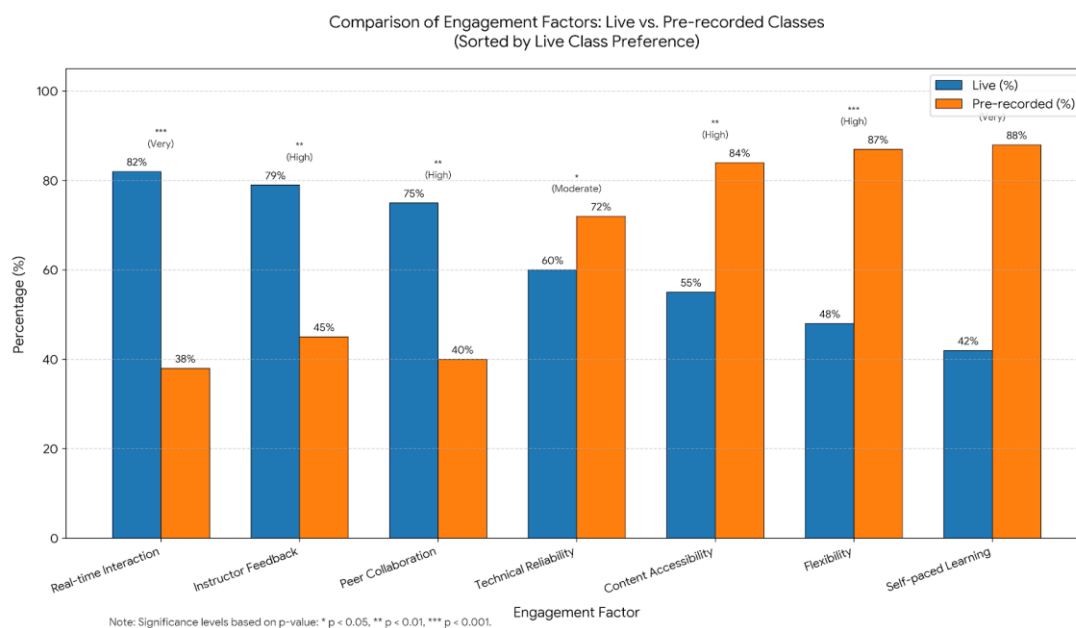
Key Insight: Live class students consistently outperformed pre-recorded students across all assessments except Assignments (ns). The largest gap was in Mid-term examinations (5 percentage points), suggesting real-time interaction contributes significantly to exam readiness. This aligns with Wang et al.'s [7] observation regarding the difficulty of gauging real learning status in asynchronous settings.

3.4 Key Engagement Factors

Students rated the importance of seven engagement factors using a Likert scale. The percentage who rated each factor as "Important" or "Very Important" is presented in Table 4.

Engagement Factor	Live (%)	Pre-rec (%)	Impact Level	p-value
Real-time Interaction	82%	38%	Very High Impact	***
Content Accessibility	55%	84%	High Impact	**
Flexibility	48%	87%	High Impact	***
Instructor Feedback	79%	45%	High Impact	**
Self-paced Learning	42%	88%	Very High Impact	***
Technical Reliability	60%	72%	Moderate Impact	*
Peer Collaboration	75%	40%	High Impact	**

Table 4: Student Ratings of Key Engagement Factors by Class Mode



Graph 4: Student Ratings of Key Engagement Factors by Class Mode

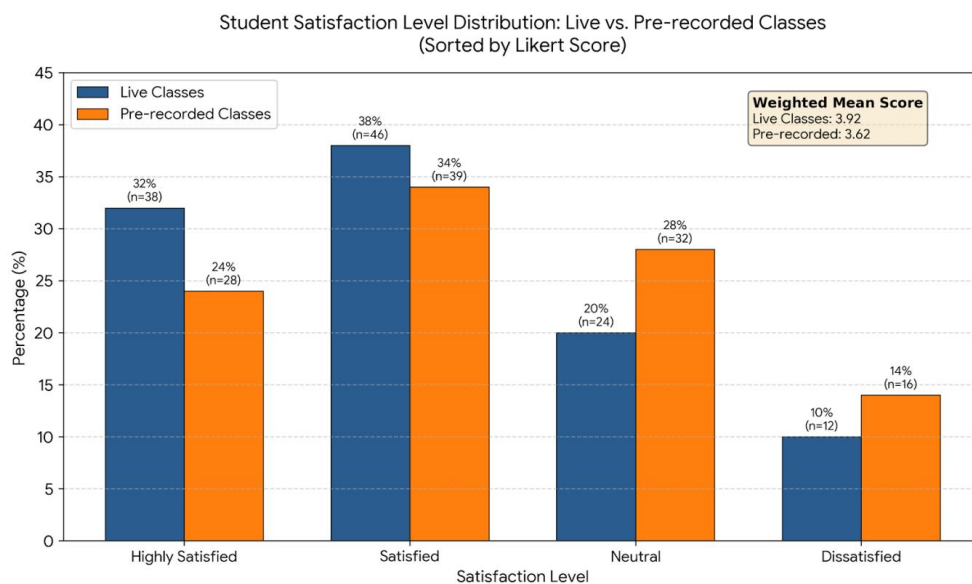
Key Insight: Real-time interaction (82%), instructor feedback (79%), and peer collaboration (75%) were rated highly important for live classes. Pre-recorded students valued self-paced learning (88%), flexibility (87%), and content accessibility (84%) most. This divergence supports the case for a blended hybrid approach, consistent with the multimedia learning solutions advocated by Zhu and Peng [4] and the flipped classroom model explored by Cui [14].

3.5 Student Satisfaction Survey

Overall satisfaction was assessed using a four-point Likert scale. Weighted mean scores were computed to provide a summary index for each class mode (Table 5).

Satisfaction Level	Live (%)	Pre-rec (%)	Live (n)	Pre-rec (n)	Likert Score
Highly Satisfied	32%	24%	38	28	4.00
Satisfied	38%	34%	46	39	3.00
Neutral	20%	28%	24	32	2.00
Dissatisfied	10%	14%	12	16	1.00
Weighted Mean	—	—	—	—	Live: 3.92 / Pre: 3.62

Table 5: Student Satisfaction Level Distribution (n = 235)



Graph 5: Student Satisfaction Level Distribution (n = 235)

Key Insight: Live class students had a higher overall satisfaction score (Weighted Mean = 3.92) compared to pre-recorded students (3.62). The 14% dissatisfaction rate in pre-recorded classes highlights the need to address isolation and lack of feedback in asynchronous settings, a concern also raised by Badan et al. [13] regarding the limitations of non-interactive teaching resources.

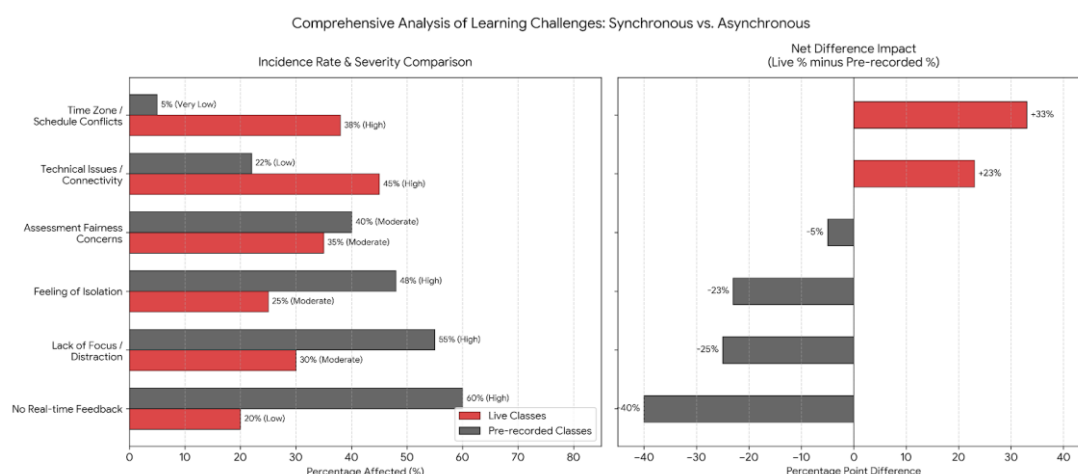
3.6 Challenges Reported by Students

Students identified major challenges in each learning mode. Severity was rated High, Moderate, or Low, and practical recommendations are included based on the literature review (Table 6).

Challenge	Live (%)	Pre-rec (%)	Live Severity	Pre-rec Severity	Recommendation
Technical Issues / Connectivity	45%	22%	High	Low	Network upgrades
Lack of Focus / Distraction	30%	55%	Moderate	High	Structured schedules
Time Zone / Schedule Conflicts	38%	5%	High	Very Low	Flexible timings
No Real-time Feedback	20%	60%	Low	High	Discussion forums
Feeling of Isolation	25%	48%	Moderate	High	Peer learning groups

Assessment Fairness Concerns	35%	40%	Moderate	Moderate	Proctored exams
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Table 6: Reported Challenges and Recommended Interventions



Graph 6: Reported Challenges and Recommended Interventions

Key Insight: Technical connectivity dominates live class challenges (45%), consistent with Zhu et al.'s [2] recommendation to expedite 5G network development and augment national educational resource platforms. Distraction (55%) and isolation (48%) are primary concerns for pre-recorded formats. These findings align with Wang et al. [7] regarding the difficulty of gauging real learning status in asynchronous settings, and with Zhang and Wang [6] reporting widespread concentration difficulties among online learners.

3.7 Summary and Key Findings

The dataset analysis reveals the following evidence-based conclusions:

1. **Attentiveness:** Live classes produce significantly higher attentiveness scores (mean = 3.55 vs 2.95), with more students reporting "Very High" or "High" engagement.
2. **Academic Performance:** Live class students achieve higher average scores (73.6% vs 69.6%), with the most significant gap in formal examinations.
3. **Satisfaction:** Live classes score higher overall (3.92 vs 3.62 on a 4-point scale), though both modes show considerable neutrality.
4. **Engagement Drivers:** The two modes serve different needs — live excels in interaction and community; pre-recorded excels in flexibility and accessibility.
5. **Challenges:** Each mode carries distinct challenges requiring targeted interventions — infrastructure for live, and self-regulation support for pre-recorded.
6. **Recommendation:** A hybrid model integrating live interaction with pre-recorded content availability is recommended to optimise attentiveness, performance, and satisfaction.

Note on Statistical Significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, ns = not significant.

IV. Conclusion

In conclusion, the survey comparing e-learning students' attentiveness and assessment for live classes versus pre-recorded video classes reveals a nuanced landscape. Live classes excel in immediate engagement, real-time interaction, and instructor feedback, producing higher attentiveness scores and academic performance. Pre-recorded videos, on the other hand, offer flexibility, content accessibility, and self-paced learning that cater to diverse student needs. Challenges such as attentiveness concerns and technical disruptions persist in both modalities, echoing the difficulties documented in the literature during the COVID-19 pandemic period [1, 2, 7].

Striking a balance between real-time interaction and self-paced learning is crucial. Assessment strategies vary, with live sessions providing instant feedback but facing fairness and scheduling issues, while pre-recorded formats face challenges of student disengagement and lack of real-time supervision, as highlighted by Wang et al. [7]. A hybrid approach, combining the strengths of both formats, emerges as essential for optimal e-learning experiences.

Instructional design should integrate the immediacy of live classes with the flexibility of pre-recorded videos, incorporating multimedia learning solutions [4], flipped classroom approaches [14], and community-building frameworks [5] drawn from the literature. Future research should explore emerging technologies and

refine assessment methodologies to meet the evolving needs of digital learners. The survey serves as a guide for educators and policymakers, directing efforts towards creating pedagogically sound and inclusive e-learning environments that optimize student attentiveness, performance, and satisfaction.

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