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PERCEPTION TOWARDS BLENDED LEARNING EFFECTIVENESS: THE RELATIONSHIP BETWEEN STUDENT CHARACTERISTICS, DESIGN FEATURES AND OUTCOMES

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ABSTRACT

Higher education institutions now prioritize blended learning because this educational model effectively combines classroom instruction with online learning programs following digitalization trends in education. The research investigates student perceptions about blended learning effectiveness through analysis of the relationship between individual characteristics of students and instructional design elements and resulting educational outcomes. The research examines the relationship between students' self-regulation abilities along with their learning styles and digital literacy skills concerning their satisfaction within blended learning environments. The study investigates instructional design elements related to interactive content, clear objectives and flexibility together with technological support which affects students' perceived learning quality and academic achievements. Undergraduate and postgraduate students enrolled in various disciplines that have participated in blended learning programs took part in this survey-based research. Students who demonstrate strong self-regulation abilities together with digital competence show positive learning outcomes along with improved perceptions. Actual learning outcomes depend heavily on design features that integrate multimedia interaction coupled with prompt feedback structures together with support channels. The research demonstrates the need for designing instruction to match individual student characteristics in order to maximize learning potential. Through empirical research this study adds evidence about the elements which boost blended learning effectiveness to the discussion on digital pedagogy. The findings provide valuable recommendations for educational institutions and teaching staff who aim to enhance their blended learning practices for better student satisfaction and outcome success.

*Keywords: Blended learning, student characteristics, learning outcomes, instructional design, digital literacy, self-*regulation, learner engagement and higher education.

INTRODUCTION:

The landscape of higher education has undergone a radical transformation in recent years, driven largely by technological advancements and changing learner expectations. Among the most significant developments is the rise of **blended learning**, a pedagogical model that combines traditional face-to-face instruction with online learning components to create a more flexible and personalized educational experience. This hybrid approach promises not only to improve access and convenience but also to enrich the quality of teaching and learning through the strategic integration of digital tools and resources. In the wake of the COVID-19 pandemic, the shift towards blended learning has accelerated, prompting educators and institutions to reassess teaching methodologies and student engagement strategies. Blended learning serves different students based on several factors which include both the features of the teaching design and the characteristics and performance of the learners. Self-regulation together with digital literacy and learning styles and motivational traits of students create the essential elements determining their success in blended learning

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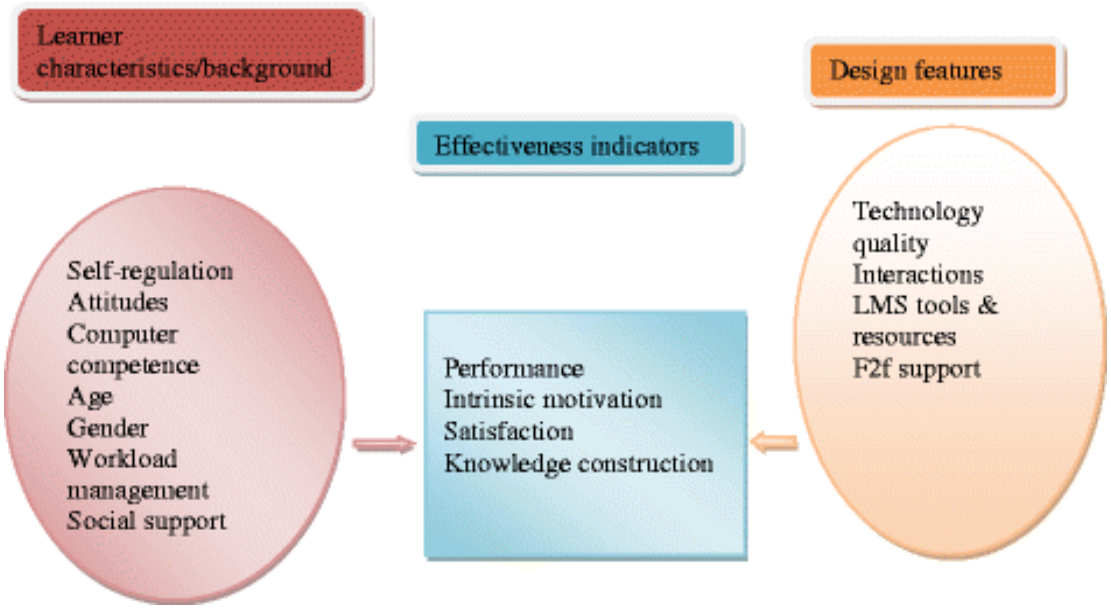
settings. Students who demonstrate self-regulation abilities to set goals and maintain time frames and track their performance will be successful in learning environments that ask for independent work. Improved digital competence in students enables them to maximize their use of learning management systems along with online discussion forums and multimedia resources.

Instructional features within blended learning models play an essential role alongside the construct. Hayley Lockman and Candice Thomas stated that quality blended courses originate from the strategic assembly of online and in-person elements to optimize student access and interaction while collecting feedback. Academic performance along with learner satisfaction improves significantly when blended learning includes interactive content which is paired with clear objectives activities and responsive support systems. The way features blend with student characteristics demands research on designing effective blended learning systems which focus on inclusive student engagement and outcome success.

The outcome assessment of blended learning includes cognitive indicators such as knowledge acquisition and critical thinking alongside behavioral indicators like participation and attendance along with affective indicators like motivation and satisfaction. Research has confirmed enhanced student achievement through blended learning yet more insights are needed about students' differing effectiveness perceptions along with designs for diverse learning requirements. Higher education innovation needs a deep student perception knowledge along with understanding how students learn to advance digital pedagogical innovations.

Chart: 1



A research initiative aims to link different student attributes to blend learning implementation features and student-perceived educational results. The research collects data from students of different academic backgrounds to reveal patterns which enable creating better blended learning approaches for all students. The research analyzes student attitudes about blended learning effectiveness through assessments of their individual learning styles and their digital skill development and their background use of online resources. Students participated in this research to identify specific design features that proved effective during their learning

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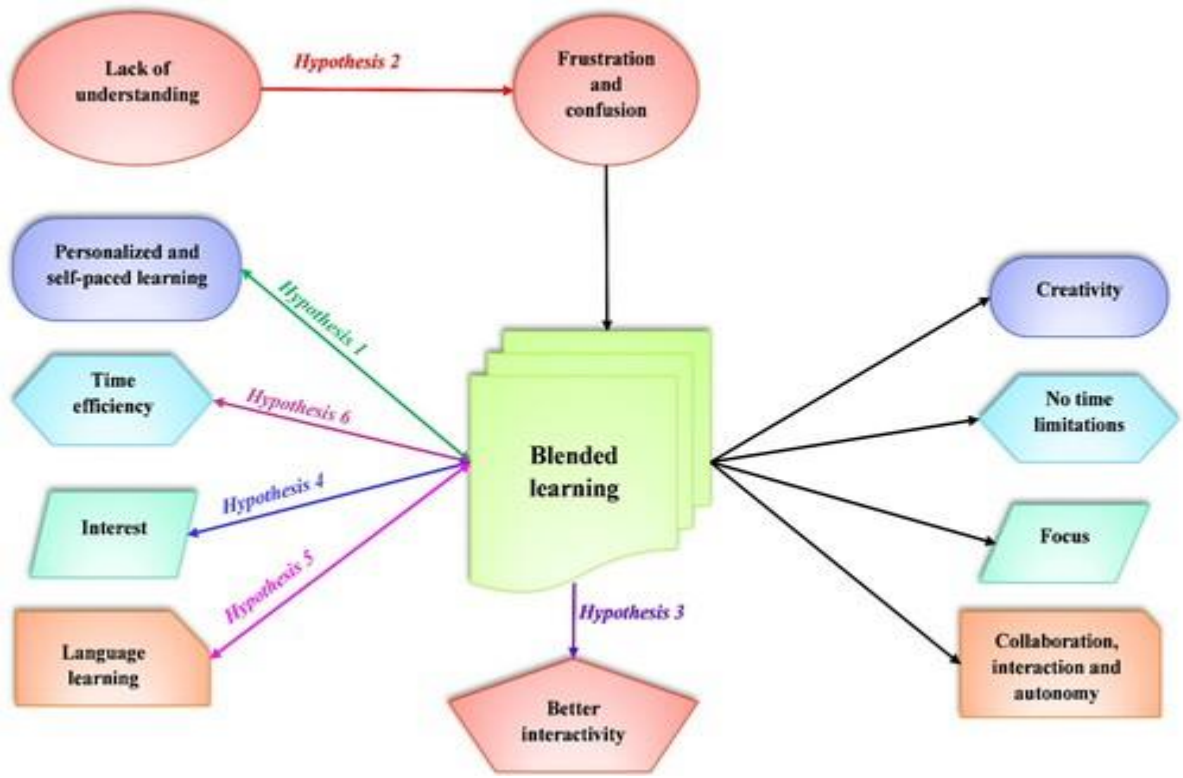
processes among interactive media and flexible scheduling and collaborative tools and feedback mechanisms.

The research aims to add to studies about blended learning effectiveness through its findings which provide practical guidance for educational staff members and government decision-makers and designers of educational materials. The investigation examines core factors affecting student experiences so researchers may create blended learning programs which combine technical excellence with methods that support both effective teaching practices and student-centered learning approaches. The importance of understanding how students perceive blended learning effectiveness will rise as digital educational paradigms evolve in future. Successful learning environments develop through knowledge of student needs because they unite face-to-face instruction with online platforms to enhance education quality and boost academic achievement and learner satisfaction.

Chart: 2



LITERATURE REVIEW

Kintu, Zhu, and Kagambe (2017) explored the effectiveness of blended learning by examining the interplay between **student characteristics**, **design features**, and **learning outcomes** in higher education. Their study utilized a quasi-experimental design involving university students in Uganda, aiming to determine how these variables influenced cognitive (academic performance), affective (motivation and satisfaction), and behavioral (engagement) learning outcomes. Key student characteristics examined included prior knowledge, self-regulation, and motivation, while design features included instructional strategies, learning content, and technological tools. The findings revealed that both student characteristics and design features significantly affected learning outcomes, with self-regulated learning and instructional design playing a particularly critical role. For instance, students who were better at managing their learning processes benefitted more from the blended environment. Similarly, well-structured course content, clear learning objectives, and

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interactive multimedia tools enhanced student engagement and performance. The study concluded that to maximize the effectiveness of blended learning, instructional designers must consider individual learner traits alongside course design. This research contributes valuable insights for institutions aiming to improve blended learning practices, especially in resource-constrained contexts. It supports a learner-centered approach, emphasizing the alignment of course design with diverse student needs to enhance overall academic achievement and satisfaction.

Bigatel et al. (2012) determined the essential competencies required for effective online instruction. Through a comprehensive survey and analysis involving experienced online educators, the study identified a framework of key skills and attributes that contribute to teaching success in virtual learning environments. These competencies were grouped into categories such as active learning, administration and leadership, instructional design, communication, and technology proficiency. A central finding was that beyond content knowledge, successful online instructors must demonstrate strong interpersonal communication, adaptability, and a commitment to continuous improvement. The research highlighted the importance of creating a supportive, engaging, and student-centered online atmosphere, where timely feedback and presence play a critical role. Additionally, the study emphasized that professional development and institutional support are vital for equipping instructors with the necessary skills to meet the demands of online education. This research has had a significant impact on the development of faculty training programs and continues to guide institutions in defining quality standards for online teaching. It reinforces the notion that effective online instruction depends not only on technical tools but on pedagogical competencies and intentional course design aligned with learner needs.

Bigatel et al. (2012) identified a comprehensive set of competencies essential for online teaching success, emphasizing that effective online educators require more than just content expertise—they must also demonstrate strong pedagogical, communication, and technological skills. Their study highlights key areas such as instructional design, facilitation strategies, feedback mechanisms, and adaptability to student needs as core competencies. These elements are crucial in ensuring engagement, satisfaction, and learning effectiveness in blended or fully online environments. Their research serves as a foundational guide for faculty development programs focused on online teaching proficiency.

Srivastava and Anval (2008) explored the transformative potential of e-learning in the higher education landscape. They argued that e-learning represents a paradigm shift in educational delivery, offering flexibility, accessibility, and customization of content to suit diverse learner profiles. The study emphasized that the success of e-learning depends heavily on the integration of user-friendly technologies, the availability of digital content, and institutional readiness. Both studies converge on the idea that the effectiveness of digital or blended learning environments hinges on the preparedness of both instructors and institutions to adopt learner-centric approaches. Collectively, these findings reinforce the importance of training educators and aligning educational practices with evolving technological capabilities to enhance learning outcomes.

STATEMENT OF THE PROBLEM

The increasing use of blended learning in higher education demands wider knowledge about student perceptions of its effectiveness that involves analyzing both student characteristics and blended course design features. Universities devote resources to advanced technology systems alongside new educational approaches yet blended learning approaches yield unsatisfactory student engagement and results across different institutions. Different students

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demonstrate contrasting opinions about how blended learning affects them because some students benefit from its flexibility whereas others face difficulties with technical issues and unclear course plans. The effectiveness of blended learning demonstrates that its success goes beyond technology to depend on both how students use their self-regulation and digital abilities and their motivation levels as these features interact with content presentation systems and interactive learning activities and supportive systems. Current research lacks systematic studies that analyze the relationships between such variables from the students' perspective. If educators fail to comprehend student needs they create learning experiences which may lack alignment leading students to disengage and perform below potential. The researchers conduct this study to resolve the identified challenge through a systematic analysis of the synergy between undergraduate student demographics and educational design elements which determine the perceived effectiveness of blended learning for educational environments.

OBJECTIVES:

1. To examine the influence of student characteristics on perceived blended learning effectiveness.
2. To analyze the role of instructional design features in enhancing student engagement and satisfaction in blended learning environments.
3. To identify the relationship between blended learning design and student academic outcomes.
4. To provide actionable recommendations for optimizing blended learning based on empirical student feedback**.**

RESEARCH METHODOLOGY

The blended learning established itself as the safe teaching method for the pandemic teaching process. This research conducted qualitative examinations within Chennai city. A study uses Higher Educational Institution students from both Arts & Science and Engineering Colleges as its research sample. Simple random sampling selected 150 study participants. The Google forms functioned as the primary data collection method through their circulation process.

FINDINGS AND RESULTS

Gender can significantly influence students' perceptions of blended learning effectiveness due to differences in learning preferences, digital confidence, and communication styles. Studies have shown that female students often value collaborative learning and consistent instructor support, which can enhance their engagement in well-structured blended environments. In contrast, male students may prefer autonomous learning and technical aspects of blended platforms. These differences can affect how each group perceives the usefulness, accessibility, and overall satisfaction with blended learning. Recognizing gender-based preferences allows educators to design more inclusive blended learning experiences that accommodate diverse learner needs and promote equitable academic outcomes.

Table 1: Gender and perception of the respondents

Perception	Gender	N	Mean Rank	Z
Self-Regulated Learning Skills	Boys	75	91.85	-3.101
	Girls	75	92.32	
Motivation and Attitudes	Boys	75	90.25	-3.241
	Girls	75	99.71	

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Digital Literacy and Technical Competence	Boys	75	98.65	-1.101
	Girls	75	90.25	
Prior Knowledge and Academic Preparedness	Boys	75	92.21	-3.254
	Girls	75	91.42	
Learning Styles and Preferences	Boys	75	94.36	-0.261
	Girls	75	96.25	
Instructor Presence and Feedback	Boys	75	92.11	-1.268
	Girls	75	99.60	
Accessibility and Flexibility	Boys	75	91.57	-1.472
	Girls	75	90.43	
	Total	150		

Table 1 presents the relationship between gender and perception of various factors influencing blended learning effectiveness among 150 respondents (75 boys and 75 girls). The data reveal gender-based differences in several perception areas. Girls scored higher mean ranks than boys in Motivation and Attitudes (99.71 vs. 90.25) and Instructor Presence and Feedback (99.60 vs. 92.11), indicating a greater sensitivity to interpersonal and supportive dimensions of blended learning. Conversely, boys slightly outperformed girls in Digital Literacy and Technical Competence (98.65 vs. 90.25), suggesting higher confidence or comfort with technology use. For Self-Regulated Learning Skills, Prior Knowledge, and Learning Styles, both genders reported comparable perceptions with minor variations in mean ranks. However, statistically significant Z-values (-3.241 for Motivation and Attitudes) suggest meaningful differences in perception. Notably, Accessibility and Flexibility was perceived similarly by both groups (91.57 for boys and 90.43 for girls), indicating that flexibility is a universally valued feature of blended learning. Overall, the findings imply that gender can influence how students perceive key components of blended learning, with girls tending to value support and interaction more, and boys leaning toward technical and autonomous aspects. These insights highlight the need for gender-responsive blended course designs that balance both pedagogical and technological dimensions.

IMPLICATIONS FOR THE STUDY

Results from this study possess major implications regarding stakeholder engagement in higher education institutions specifically for improving blended learning development methods. A thorough comprehension of student traits together with design elements and measured results enables teaching professionals and instructional creators to embrace student-centered teaching methods. The research findings empower institutions to produce specific interventions through training programs that enhance both students' self-regulation abilities and digital literacy competence needed for blended learning success. The study proves the necessity of planning instructional components which integrate interactive resources with clear objectives along with consistent help systems to build learner motivation and satisfaction. Policymakers who work in education can use the study to create guidelines which specify flexible teaching methods appropriate for diverse student learning requirements. This investigation adds to digital pedagogy theoretical knowledge through its exploration of how blended learning displays various effectiveness patterns. The analysis demonstrates why educators should adapt blended learning strategies to match educational demands of individual student demographics and educational institutions in developing nations. The research successfully fills an essential knowledge gap about enhancing blended learning from being just a delivery method to becoming a versatile instructional approach.

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RECOMMENDATIONS AND SUGGESTIONS

Numerous recommendations stem from the research findings which aim to boost blended learning success within higher education. Education institutions must make self-regulated learning abilities and digital competencies of students their top priority by implementing orientation programs combined with ongoing educational support. The student learning process can be significantly enhanced through workshops and digital literacy modules and embedded guidance mechanisms that exist within educational platforms. Professionals who teach blended learning should undergo training in proven teaching methods which focus on content segmentation and multimedia use and networked group work and immediate response systems. Students should participate in the co-design process of blended courses to guarantee that educational material meets their individual needs. Educational institutions should implement Learning Management Systems to accomplish two goals: first, create engaging platforms for student engagement and second, develop virtual learning environments for community development. Regular evaluations of student feedback and academic results need to be implemented to maintain a constant improvement process for course development. Both advanced technical infrastructure investments and universal access to digital tools and internet connectivity for all students remain essential tasks for institutions to fulfill. Research into the long-term effects of blended learning experiences alongside studies concerning how cultural aspects affect student learning engagement and academic results should be conducted in the future. The combination of these steps will create inclusive learning environments that produce effective and engaging blended learning systems.

CONCLUSION

Multiple factors affecting blended learning success exist in an interconnected system of student characteristics along with instructional design aspects. Higher education institutions must understand that adopting blending learning strategies as a strategic improvement method requires more than just technology implementation because success relies on appropriate integration of educational technologies with actionable instructional plans. Blended learning achieves its most effective results as designers synchronize learning environment frameworks to suit the needs and abilities and individual preferences of students. The research established that self-regulation together with motivation and digital literacy along with existing knowledge serve as crucial elements which determine student learning results. The design elements that affect student learning experiences include how the course is organized and arranged along with the level of interactivity as well as the clarity of learning objectives and the amount of instructor support provided. Students need teaching strategies with learner-centered principles that accommodate various student qualities. The educational development training which surpasses technical skills should teach educators to deliver inclusive and adaptive teaching methods with high engagement effectiveness. The study demands institutional policies that maintain constant feedback communication channels between learners and educators to make instant transformations possible for content and delivery methods.

Well-designed blended learning offers the capacity to reshape higher education into three essential elements: student independence, teamwork advancement and deeper knowledge acquisition. Educational stakeholders must put their resources into research-based educational strategies to support students' diverse learning experiences for achieving this potential. The study shows leading success in blended learning spaces needs digital access alongside meaningful design alongside constant support alongside recognition of learner voices. Blended learning institutions will achieve better student engagement and satisfaction and

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academic achievement by using a complete approach that brings together technological assets with educational techniques and learner characteristics. The research findings will establish foundational concepts to better the quality and inclusivity of blended learning education across multiple academic settings.

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