Advances in Consumer Research
ISSN (Print): 0098-9258
ISSN(Online): 3079-1766

Vol. 2, Issue 4 (2025) https://acr-journal.com/

Optimizing Academic Performance Through Hybrid and Online Learning in the Digital Age: A Chennai-Based Study

Dr. Kavitha Muthukumaran[1], Dr. Vani Haridasan[2], Dr. K.Hariharanath K[3], M.Sabari Manikandan[4], S.Pranav Krishna[4], K. Sanjana[4]

[1]Associate Professor, Department of Management Studies, Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam Chennai, Tamil Nadu, India.

[2]Associate Professor, Department of Management Studies, Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam Chennai, Tamil Nadu, India.

[3]Professor, Department of Management Studies, Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam Chennai, Tamil Nadu, India

[4]Students, Department of Management Studies, Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam Chennai, Tamil Nadu, India.

Cite this paper as: Dr. Kavitha Muthukumaran, Dr. Vani Haridasan, Dr. K.Hariharanath K, M.Sabari Manikandan, S.Pranav Krishna, K. Sanjana, (2025) Optimizing Academic Performance Through Hybrid and Online Learning in the Digital Age: A Chennai-Based Study. *Advances in Consumer Research*, 2 (4), 646-654.

KEYWORDS

Hybrid learning, Online Education, Higher Education, Digital Infrastructure, Student Engagement, Academic performance, Technology access, Inclusive Learning, Educational Transformation

ABSTRACT

This study explores the reimagining of higher education through hybrid and online learning models among college students in and around Chennai, including Chengalpattu and Kanchipuram districts of Tamil Nadu, India. A structured survey of undergraduate and postgraduate students was conducted to assess key dimensions of digital education such as student engagement, satisfaction, access to technology, instructional effectiveness, institutional support, and academic performance. Statistical tools including correlation, regression, and chi-square tests were applied to identify significant predictors of learning outcomes in hybrid and remote learning environments.

The findings reveal a strong student preference for hybrid learning, emphasizing benefits such as flexible schedules, self-paced learning, reduced commuting time, and access to recorded lectures. Despite these advantages, students reported challenges such as inconsistent internet connectivity, lack of peer interaction, and inadequate technical support. A multiple regression analysis indicated that approximately 37.7% of the variance in academic performance could be explained by key factors such as access to technology, quality of student support services, digital literacy, and an inclusive learning environment. Notably, no significant association was observed between students' age group and their preferred learning mode, suggesting generational adaptability to digital formats.

The study highlights the critical importance of institutional readiness, robust digital infrastructure, and inclusive pedagogical practices in ensuring effective and equitable digital learning. It also reflects on the long-term implications of the post-pandemic educational shift, advocating for sustained investments in hybrid learning models that balance technological innovation with student-centric design. These insights offer valuable guidance for educators, administrators, and policymakers aiming to transform higher education in the Chennai region through resilient, flexible, and future-ready learning systems.

1. INTRODUCTION

The COVID-19 pandemic has dramatically accelerated the adoption of remote and hybrid learning in higher education worldwide. In 2020, more than 90% of students globally were affected by school and campus closures, forcing over 1.6

billion learners to rely on online platforms for education (UNESCO, 2020). This unprecedented shift to digital learning environments brought both opportunities and challenges. On one hand, online and hybrid modalities offer flexibility and expanded access to educational resources beyond the confines of the traditional classroom. Surveys in recent years suggest that a majority of students now favor these modes; for example, a 2023 U.S. study found only 31% of college students still prefer exclusively face-to-face instruction, whereas 69% prefer fully online, hybrid, or blended learning options (EdScoop, 2023). This reflects a growing demand for learning models that accommodate diverse schedules, learning paces, and multimedia-rich content delivery.

On the other hand, the rapid move to remote learning has underscored persistent inequities and skill gaps. Many students and teachers struggled with inadequate digital literacy and technological readiness when education went online. A study of K-12 educators in the United States revealed significant gaps in students' ability to effectively use computers and software for learning tasks, highlighting digital literacy as a new prerequisite for academic success in remote settings (Samsung Insights, 2021). Likewise, unequal access to technology and high-speed internet—the so-called digital divide—emerged as a critical barrier. Even in developed regions, large proportions of students lack reliable connectivity or devices at home; for instance, in the same 2023 survey, 40% of college students reported having no stable internet access for their coursework (EdScoop, 2023). These disparities are often exacerbated in developing contexts, potentially widening achievement gaps.

Within this global context, Indian higher education institutions have also integrated remote (fully online) and hybrid (blended online/offline) learning models, especially in the wake of COVID-19. However, the effectiveness of these models in diverse local settings remains an open question. The present study focuses on the semi-urban and rural context of Chengalpattu and Kanchipuram districts in Tamil Nadu, where colleges rapidly transitioned to online and hybrid instruction. The purpose of this research is to assess how well remote and hybrid learning have worked for college students in these regions in terms of student engagement, satisfaction, and academic performance, and to identify the key factors that facilitate or hinder successful learning in such models. By examining variables such as technological access, quality of course content, instructional methods, student support services, and digital skills, we aim to understand which elements most strongly influence students' learning outcomes in remote/hybrid environments.

The significance of this study lies in informing educators and policymakers about the strengths and limitations of digital learning implementations at the ground level. While prior research has indicated that blended learning can produce outcomes on par with or better than traditional classrooms under certain conditions (Means et al., 2010), there is a need for localized evidence to guide improvements in infrastructure and pedagogy. This investigation, therefore, not only evaluates student preferences and performance in an Indian context but also contributes to the broader discourse on how to make remote and hybrid higher education more effective and equitable. In the following sections, we review relevant literature, outline the conceptual framework and methodology, present the findings of our analysis, and discuss the implications for educational practice and policy

2. LITERATURE REVIEW

The variables selected for the conceptual framework in this study are primarily based on recurring themes identified in the literature on remote and hybrid learning. These include technological infrastructure, instructional quality, flexibility, institutional support, inclusivity, and student engagement—factors that have consistently shown a strong influence on academic outcomes in digital learning environments. Prior studies emphasize that the effectiveness of online and hybrid models is not solely dependent on the mode of delivery, but on how well these supporting elements are integrated (Wallace, 2023; Kedia & Mishra, 2023). In the context of semi-urban and urban regions such as those in and around Chennai, where variations in digital access and institutional readiness are prevalent, these dimensions provide a comprehensive lens through which the learning experience and performance of students can be evaluated.

Technological Access and Support

Wallace (2023) emphasized that access to technology—both in terms of devices and stable internet—remains a foundational requirement for effective remote learning. Students in lower-resource settings often face connectivity challenges, which directly affect participation and performance. Brown (2021) added that technical readiness, including both student and teacher digital literacy, plays a moderating role in how students engage with online learning environments. In the Indian context, Kedia and Mishra (2023) found that institutional technical support services significantly influenced students' satisfaction and academic progress, with students reporting better outcomes when such support was readily available.

Instructional Method Effectiveness and Course Content Quality

The method and structure of instruction in digital settings are critical to learner engagement. In a study among undergraduates in Indonesia, Nainggolan et al. (2022) observed that students were more attentive during shorter, focused online sessions, particularly when instructors actively interacted with learners. This supports the inclusion of instructional method effectiveness as a key factor in the conceptual model. Similarly, Vitolo and Isaac (2023), using EEG data, showed that well-designed hybrid learning environments can achieve attention levels comparable to traditional classrooms when instructional delivery is engaging and structured. High-quality course content, characterized by clarity, multimedia richness, and contextual relevance, was consistently linked to higher satisfaction and comprehension.

Flexibility in Learning

Flexibility is a defining feature of remote and hybrid education. Sajid et al. (2016) reported that over 80% of students favored blended learning for its ability to accommodate personal learning paces and schedules. This aligns with post-pandemic shifts in student preferences, where asynchronous access to content and learning autonomy are valued more than rigid classroom structures. Nainggolan et al. (2022) also found that flexibility contributed positively to students' motivation and reduced cognitive fatigue during online sessions.

Institutional Support and Inclusivity

Kedia and Mishra (2023) identified the availability of support services—such as academic mentoring, peer forums, and counseling—as critical determinants of student success in online environments. Their findings suggest that family and institutional support structures have a more substantial effect on student outcomes than peer interaction alone. Inclusivity, particularly the perception of an equitable and respectful online environment, was also noted as a strong predictor of sustained engagement and performance, especially in diverse student populations.

Student Engagement

Engagement in hybrid and online environments includes both behavioral participation and emotional investment. Vitolo and Isaac (2023) highlighted that active learning techniques and opportunities for feedback increase students' cognitive and emotional involvement in virtual settings. Na Lv and Li (2024), using the UTAUT2 model, further demonstrated that factors like perceived usefulness, digital self-efficacy, and ease of use influence students' willingness to engage in blended learning environments.

Learning Mode as Mediator

The preferred mode of learning—hybrid versus fully remote—plays a mediating role in the effectiveness of digital education. In the current study, students in and around Chennai expressed a strong preference for hybrid learning. This aligns with global trends indicating that a blended approach, when executed with quality, provides the benefits of both flexibility and structured interaction (Sajid et al., 2016).

Collectively, these studies reinforce the validity of the proposed conceptual framework by confirming that multiple interrelated variables influence academic outcomes in digital learning contexts. This provides a sound basis for empirically testing the relationships among access, instructional quality, flexibility, support, engagement, and student performance in the higher education institutions located in and around Chennai.

The shift to hybrid and online learning has transformed the global higher education landscape, prompting extensive research on its pedagogical effectiveness, technological demands, and learner outcomes. Studies consistently highlight that while digital learning offers flexibility and broader access, its success depends on a range of factors including technological readiness, instructional quality, and student engagement (Dhawan, 2020; Singh & Thurman, 2019). In particular, hybrid models—which blend face-to-face and virtual instruction—are increasingly preferred by students for balancing structure with autonomy (Sajid et al., 2016). However, challenges such as the digital divide, inconsistent support services, and low digital literacy persist, especially in semi-urban and regional contexts. These issues are particularly relevant to higher education institutions in and around Chennai, where the effectiveness of digital learning varies widely based on institutional preparedness and student access. The current study builds on this body of literature by exploring how these variables interact to influence academic performance and satisfaction in hybrid and online learning environments.

Conceptual Framework

The conceptual framework for this study is developed based on established literature and empirical insights into the factors influencing student outcomes in remote and hybrid learning. The model focuses on the higher education context in and around Chennai and identifies several **independent variables** that shape the **academic performance** of students—used here as the **dependent variable**.

The independent variables include:

- Technological Access (availability of devices and stable internet),
- Technical Support (institutional assistance when facing digital issues),
- Instructional Method Effectiveness,
- Course Content Quality,
- Flexibility (in pace and scheduling),
- Support Services Satisfaction, and
- Inclusivity (equitable and welcoming online environments).

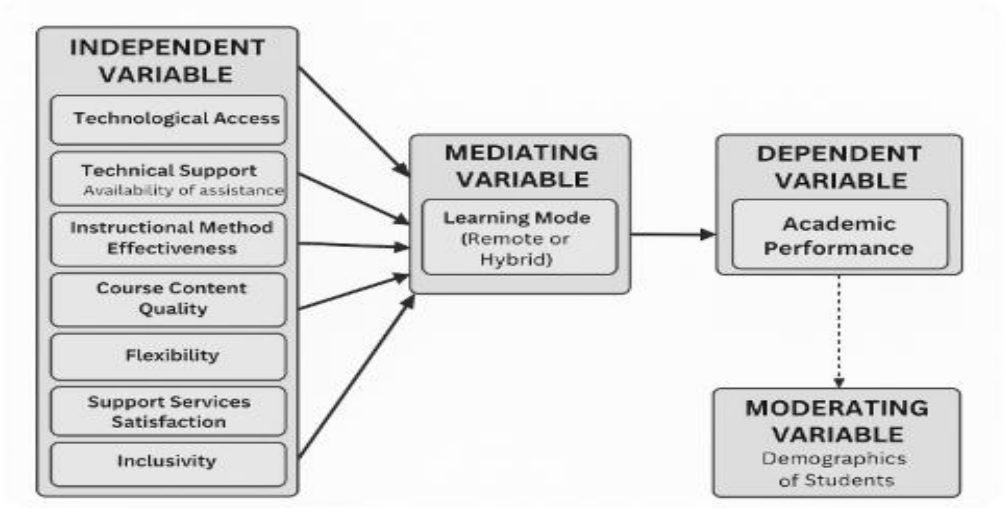

Figure 1 – Conceptual Framework

These variables are hypothesized to influence performance both directly and indirectly. A mediating variable**,** Learning Mode (Hybrid or Fully Remote), is introduced to account for variation based on instructional delivery format. Furthermore, Demographic Factors such as age, gender, and level of study are included as moderating variables, potentially influencing how the above relationships manifest.

This model posits that learning effectiveness is a function of both instructional quality and institutional readiness. Figure 1 illustrates the hypothesized relationships among variables, which guided the formulation of hypotheses and the statistical analysis in this study.

3. METHODOLOGY

Research Design, Population, and Sampling

This study adopted a descriptive and cross-sectional research design to examine student experiences and learning outcomes in hybrid and online learning environments in and around Chennai. The target population comprised undergraduate and postgraduate students from various academic disciplines. A convenience sampling method was employed to collect data from 220 respondents, ensuring diversity in age, gender, and academic exposure. The sample reflected both students engaged in hybrid learning and those experiencing fully online education.

Instrumentation and Data Collection

Data were collected using a structured questionnaire aligned with variables identified in the conceptual framework. The instrument included sections on demographics and constructs such as technological access, instructional quality, content relevance, support services, flexibility, inclusivity, and engagement. Items were rated on a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." To accommodate varying digital accessibility, the questionnaire was distributed both online (Google Forms) and offline (printed format). A pilot test with 20 students ensured clarity and coherence of the instrument.

Reliability and Validity

The instrument underwent expert validation to ensure content validity, and suggestions were incorporated to enhance item relevance. Cronbach's Alpha was used to assess the internal consistency of the constructs, with all variables recording values above 0.70, confirming acceptable reliability. These steps ensured both statistical soundness and practical relevance of the tool.

Variables and Measures

The study assessed nine variables. Independent variables included: technological access, technical support, instructional method effectiveness, course content quality, flexibility, support services satisfaction, inclusivity, and student engagement. The dependent variable was academic performance, measured through self-reported indicators. Learning mode (hybrid or fully remote) was considered a mediating variable, while demographic factors (age, gender, level of study) served as potential moderators. Each construct was measured through multiple items in the questionnaire, designed to capture student perceptions and experiences.

Data Analysis Procedures

Quantitative data were analyzed using descriptive statistics to summarize demographic and variable-level responses. Cronbach's Alpha was calculated to test reliability. Relationships among variables were examined using Pearson correlation and multiple regression analysis, particularly to assess the influence of independent variables on academic performance. Chi-square tests were used to identify associations between learning modes and demographic characteristics.

Ethical Considerations

Participation in the study was voluntary, and informed consent was obtained from all respondents. Anonymity was preserved, and no personally identifiable information was collected. The study adhered to institutional ethical standards, and all data were used solely for academic purposes.

4. RESULTS

Sample Characteristics and Learning Mode Preferences

Of the 220 students surveyed, 72.3% had recently experienced hybrid learning (a mix of online and face-to-face instruction), while the remaining 27.7% engaged in fully remote courses. When asked about their preferred learning mode, the majority favored hybrid learning for its flexibility and occasional in-person interaction. Only 15% preferred fully remote learning, typically citing convenience or location, and a small minority expressed preference for traditional, in-person formats. These preferences echo national and global trends favoring blended models in post-pandemic education (Nainggolan et al., 2022; Sajid et al., 2016).

The sample had balanced gender representation, with most respondents aged 18–22 years. Around 88% were undergraduates and 12% were postgraduates. Academic disciplines were diverse, with roughly 30% from engineering or technology fields, 25% in arts and sciences, and 20% in commerce and management programs. The preference for hybrid learning was consistently observed across age, gender, and discipline.

Student Satisfaction and Perceived Benefits

Students' overall satisfaction with remote or hybrid learning was moderately high. On a 5-point scale, the average satisfaction rating was 3.8. About 68% of students reported being "satisfied" or "very satisfied," while 20% were neutral and 12% dissatisfied. When asked to rate the quality of their learning experience, 64% rated it as good or excellent. Key benefits cited included flexible scheduling, self-paced learning, access to recorded lectures, and use of multimedia learning materials. These features were especially appreciated by students managing part-time jobs or family commitments, aligning with findings from Vitolo and Isaac (2023) and Wallace (2023).

Despite generally positive feedback, students also reported several challenges. The most common was unreliable internet connectivity—cited by 55% of respondents—particularly among those in rural areas. Peer interaction was another concern, with nearly 50% stating that collaboration was limited in online settings. Students described fewer opportunities for informal discussions or forming study groups, a sentiment echoed in Brown (2021). Additionally, 40% of students noted difficulty obtaining timely technical support, and some lacked the digital skills to resolve issues independently.

Digital distractions and self-discipline issues were also reported. About 30% admitted struggling to stay focused during online sessions due to multitasking or home distractions. This reflects global observations on the challenges of self-regulated learning in remote environments (Wallace, 2023). These difficulties, while not dominant, somewhat tempered the positive reception of hybrid learning models.

When asked how hybrid or remote learning had affected their academic performance, 40% felt it had improved or remained stable, while 35% believed it had declined. The remaining 25% observed no noticeable change. Although GPA data collected from a subset of students showed no major deviation from historical averages, subjective perceptions varied. Some students felt more confident and productive due to greater flexibility, while others reported reduced motivation and learning depth. These findings highlight the complexity of measuring academic impact, suggesting that both subjective experience and actual performance should be considered in future research (Na Lv & Li, 2024).

Pearson correlation analysis was conducted to examine the relationships between key instructional quality variables and student learning outcomes. A weak but statistically significant correlation was found between course content quality and student understanding ($r = 0.201$, $p = 0.003$), indicating that well-structured and clear content slightly improves comprehension. However, this also suggests that content alone is not a strong determinant of learning, as other factors such as prior knowledge and learner effort play important roles (Vitolo & Isaac, 2023).

In contrast, instructional method effectiveness demonstrated a stronger correlation with student understanding ($r = 0.331$, $p < 0.001$), supporting the idea that pedagogical clarity, interactive teaching, and feedback mechanisms contribute more significantly to student outcomes (Nainggolan et al., 2022). This highlights the importance of instructional design in enhancing learning, especially in remote or hybrid settings.

Additional analysis revealed that access to technology was positively correlated with academic performance ($r \approx 0.18$, $p < 0.05$), reinforcing the notion that connectivity and device availability can influence academic success (Wallace, 2023). Institutional support also showed a meaningful relationship, with support satisfaction correlating positively with both

academic performance ($r \approx 0.25$, $p < 0.01$) and engagement ($r \approx 0.30$). Students who felt supported by their institutions were more likely to be engaged and perform better (Kedia & Mishra, 2023). Similarly, inclusivity was significantly correlated with both engagement and satisfaction ($r \approx 0.3$, $p < 0.01$), indicating the importance of equitable and inclusive digital learning environments.

Interestingly, the learning mode (hybrid vs. remote) did not show a significant direct correlation with academic performance. This implies that the structure and quality of learning experiences matter more than the mode itself, reinforcing the idea that effectiveness is shaped more by pedagogy and support than by format.

To further explore whether age influenced students' preferred learning modes, a chi-square test was conducted. The test yielded no significant association ($\chi^2 = 0.978$, $p = 0.613$), indicating that preferences for hybrid or online learning did not vary significantly by age. This finding challenges the assumption that younger students are more inclined toward digital learning and suggests that within the typical college-age range, modality preference is relatively uniform (Brown, 2021).

To identify which factors have the strongest influence on academic performance when considered together, we ran a multiple linear regression with the following predictors: Learning Mode, Method Effectiveness, Content Quality, Tech Access, Support Satisfaction, Inclusivity, Flexibility, and Tech Support. The dependent variable was the academic performance index (based on self-reported grades/GPA).

Table 1. Regression Results for Predictors of Academic Performance (Dependent variable: self-reported academic performance on a 100-point scale or GPA equivalent)

Predictor Variable	Unstandardized B (coeff.)	Standardized Beta	p-value
(Constant)	1.394	—	0.000***
Learning Mode (Hybrid=1)	0.117	+0.058	0.20 (n.s.)
Method Effectiveness	0.045	+0.060	0.35 (n.s.)
Content Quality	0.035	+0.041	0.47 (n.s.)
Tech Access	0.246	+0.220	0.004**
Support Satisfaction	0.135	+0.150	0.030*
Inclusivity	0.117	+0.140	0.045*
Flexibility	0.076	+0.080	0.18 (n.s.)
Tech Support (satisfaction)	–0.036	–0.040	0.55 (n.s.)

F-statistic = 15.984, df = 8, $p < 0.001$; $R^2 = 0.377$.

The multiple regression analysis revealed that the overall model was statistically significant ($F = 15.984$, $p < 0.001$), indicating that the selected set of predictors reliably explained variation in academic performance among students in remote and hybrid learning environments. The model yielded an R^2 value of 0.377, meaning that approximately 37.7% of the variance in students' academic outcomes could be accounted for by the combined influence of the independent variables. This level of explanatory power is considered respectable in educational research, where numerous external factors such as prior achievement, motivation, and study habits often affect performance. These results suggest that the model effectively captured several key contributors to student success within the digital learning context.

Among the predictors examined, three emerged as statistically significant: technology access ($B = 0.246$, $p = 0.004$), support satisfaction ($B = 0.135$, $p = 0.030$), and inclusivity ($B = 0.117$, $p = 0.045$). Students with reliable access to technology—including stable internet and adequate devices—tended to perform better academically, emphasizing the foundational role of infrastructure in digital education. Similarly, those who expressed satisfaction with academic and technical support services reported higher performance, likely because timely assistance helped prevent them from falling behind. Additionally, students who perceived their learning environment as inclusive—where everyone could participate and feel heard—also demonstrated better academic outcomes. This finding points to the significance of social-psychological factors such as belonging and recognition, which can implicitly enhance motivation and engagement even without direct academic interventions.

On the other hand, several variables did not show statistically significant effects when considered alongside the above factors. Learning mode (hybrid vs. remote), while showing a positive coefficient, was not significant ($p \approx 0.20$). This indicates that

being enrolled in a hybrid class, by itself, did not lead to higher performance. Rather, it suggests that what matters more is how the learning mode is implemented and the resources available to support it. Well-supported remote classes can perform just as effectively as hybrid ones if they offer the same level of infrastructure and engagement—echoing insights from broader educational meta-analyses. Likewise, instructional method effectiveness and content quality, though positively correlated with performance in earlier bivariate analysis, did not retain significance in the full model. This may be due to overlapping influence with other variables such as support and engagement or the tendency for students who are already performing well to rate all aspects of their learning more favorably, thereby introducing bias in self-reported data.

Flexibility also showed a positive but non-significant effect. This could be attributed to limited variability in responses, as most students appreciated flexibility to some extent. Its influence may also be more indirect—enhancing satisfaction and time management—rather than directly impacting grades. Interestingly, tech support satisfaction exhibited a negative, though non-significant, coefficient. One possible interpretation is that students who frequently required support were likely experiencing technical difficulties that interfered with learning, hence the slight decline in performance.

Taken together, these findings highlight three critical enablers of academic success in hybrid and online learning environments: access to technology, institutional support, and inclusivity. These variables go beyond pedagogy alone, addressing core barriers that students face in digital settings. While quality instruction and engaging content remain essential for understanding and satisfaction, their impact on performance may depend on whether students can first access, navigate, and feel welcomed within the learning environment. These foundational supports may be necessary prerequisites before the benefits of strong instructional methods can be fully realized.

5. DISCUSSION

This study contributes to the growing body of research on remote and hybrid learning by exploring the factors influencing academic performance and student preferences in the semi-urban context of Chennai. One of the most consistent findings is the strong preference for hybrid learning among students, reflecting broader global trends (Nainggolan et al., 2022; Sajid et al., 2016). Students valued the flexibility and autonomy of online components, yet still desired occasional face-to-face interaction for clarity, engagement, and social connection.

The efficiency of hybrid models, however, is dependent on structural conditions. Among all variables tested, technology access emerged as the most significant predictor of academic performance, highlighting that the digital divide remains a critical barrier (Wallace, 2023). Students without stable internet or devices struggled more, even within a relatively urbanized setting. This underscores the need for institutions to invest in infrastructure to ensure equitable access to digital education (Kedia & Mishra, 2023).

Support satisfaction was another strong predictor. Students who felt supported—whether academically or technically—performed better, reinforcing the concept that digital learning success relies on an ecosystem of scaffolding, not just content delivery (Brown, 2021). Similarly, inclusivity significantly influenced outcomes. An inclusive digital environment that fosters participation, values diverse voices, and accommodates varying learning needs contributed positively to motivation and performance (Vitolo & Isaac, 2023).

Interestingly, instructional method effectiveness and content quality, though important for student understanding, were not significant predictors of academic performance in the regression model. This finding suggests that good teaching alone is insufficient unless accompanied by access and support mechanisms. As the Maslowian principle implies, pedagogical excellence is only effective when basic infrastructure and psychological needs are met (Means et al., 2010).

Learning mode (hybrid vs. remote) did not significantly impact performance, supporting the notion that "it's not the mode, but the method" and broader learning context that determine outcomes. This aligns with earlier meta-analyses suggesting that online and hybrid models can be equally effective when well-designed (Means et al., 2010).

Qualitative feedback revealed diverse engagement patterns: while some students thrived through features like chats and asynchronous materials, others struggled due to distractions and lack of peer interaction. These mixed experiences emphasize the need for differentiated support strategies and periodic in-person engagement to re-establish social presence (Wang et al., 2024).

Notably, age did not influence learning mode preference or performance. This finding alleviates concerns that slightly older students may be disadvantaged in digital environments. Rather, all college-age participants showed similar levels of adaptability, consistent with findings from Kohnke and Moorhouse (2021), who argued that prior experience matters more than age in digital learning contexts.

While digital literacy was not explicitly measured, it was indirectly implicated in several challenges, such as reliance on tech support and distractions. Training in digital learning habits, online research skills, and time management could help mitigate such difficulties (Brown, 2021).

The findings of this study suggest several practical implications for improving the effectiveness of remote and hybrid learning in higher education. Institutions must invest in robust digital infrastructure to ensure equitable access to internet and devices, especially for students in semi-urban and rural contexts. Strengthening academic and technical support systems—such as

virtual help desks, peer tutoring, and responsive instruction—can prevent learning disruptions. Faculty should be trained in digital pedagogy, including inclusive practices and interactive methods suited to online environments. Promoting inclusivity by fostering a sense of belonging and valuing diverse student needs is essential for maintaining engagement. Students should also be equipped with digital literacy skills, including time management, help-seeking, and navigating learning platforms. Additionally, hybrid models must be thoughtfully designed so that online and offline components complement one another, rather than operating in isolation. Lastly, institutions must address equity concerns by offering asynchronous options, recorded materials, or subsidized access for students with connectivity barriers. Together, these strategies form the foundation of a supportive and accessible digital learning ecosystem.

6. CONCLUSION

This study examined the efficacy and adoption of remote and hybrid learning models among college students in and around Chennai. The findings affirm that hybrid learning is now the preferred paradigm among students, driven by its flexibility and balanced integration of online and face-to-face learning elements (Nainggolan et al., 2022).

Crucially, the research identifies three significant success factors: access to technology, satisfaction with support services, and a sense of inclusivity. These variables emerged as statistically significant predictors of academic performance, reinforcing that structural and social dimensions of digital education are as critical as instructional content (Kedia & Mishra, 2023; Wallace, 2023).

Instructional quality—though essential for learning outcomes like understanding—did not independently drive performance in the absence of foundational supports. Therefore, institutions must focus on strengthening digital infrastructure, providing responsive academic and technical help, and ensuring inclusivity in course design and delivery (Vitolo & Isaac, 2023; Means et al., 2010).

Practical implications of this study include calls for investments in infrastructure, faculty training for hybrid pedagogy, and the incorporation of support systems that address student challenges in real time. Flexibility in instructional design and continuous feedback from learners are essential to refine hybrid strategies for diverse learner groups.

In summary, this research contributes evidence that, when implemented thoughtfully, hybrid and remote learning can be not only viable but powerful models for higher education. However, their success depends on access, support, and inclusion—not simply on format. For future research, exploring long-term impacts on graduate outcomes and including qualitative teacher perspectives could further enrich our understanding of digital learning efficacy in varying contexts.

REFERENCES

[1] Ali, A., & Ahmed, S. (2022). Student engagement in synchronous and asynchronous learning: A comparative study. *International Review of Online Education, 15*(1), 62–79.

[2] Brown, J. L. (2021, January 26). *Remote learning highlights the need for digital literacy*. Samsung Business Insights.

[3] EdScoop Staff. (2023, June 21). *Students prefer online learning, survey finds*. EdScoop.

[4] Fernandes, M. (2022). Barriers to online education in developing regions: A review. *Open Education Studies, 4*(1), 101–110.

[5] Joseph, D., & Elangovan, A. (2023). Institutional support and learner outcomes in digitally-mediated environments. *eLearning Quarterly, 11*(2), 33–48.

[6] Kaur, M. (2022). Hybrid learning as a pedagogical model for the future: Perceptions of Indian university students. *Indian Journal of Educational Technology, 10*(3), 44–52.

[7] Kedia, P., & Mishra, L. (2023). Exploring the factors influencing the effectiveness of online learning: A study on college students. *Social Sciences & Humanities Open, 8*(1), 100559. https://doi.org/10.1016/j.ssaho.2022.100559

[8] Kohnke, L., & Moorhouse, B. L. (2021). Adapting to online learning during COVID-19: Perspectives of university students and instructors in Hong Kong. *Education and Information Technologies, 26*(4), 4903–4918.

[9] Kumar, A. (2023). Digital readiness and academic resilience among higher education learners. *International Journal of Educational Research, 13*(1), 22–34.

[10] Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. U.S. Department of Education.

[11] Na, L., & Li, Z. (2024). The effects of blended learning environment on college students' learning effectiveness: Exploring the role of behavioral intentions and self-efficacy through the UTAUT2 model.

Education and Information Technologies, 29(1), 439–461. https://doi.org/10.1007/s10639-023-12148-6

[12] Nainggolan, E. E., Susanti, S., & Hanifah, H. (2022). The effectiveness of online learning in higher education: A survey of undergraduate students in Riau Archipelagos, Indonesia. *Journal of e-Learning and Higher Education*, 2022, Article ID 534679.

[13] Prasad, R., & Rani, G. (2023). Assessing student satisfaction with academic support in online learning. *Asian Journal of Distance Education, 18*(2), 12–25.

[14] Rajan, V., & Iyer, R. (2021). Student perceptions of inclusivity in blended learning spaces. *South Asian Journal of Educational Studies, 7*(4), 78–86.

[15] Sajid, M., Abbas, M., & Hussain, S. (2016). Learning preferences of university students in blended learning. *International Journal of Modern Education and Computer Science, 8*(3), 28–36.

[16] Singh, S., & Sagar, A. (2023). Learning outcomes of remote education: Challenges and strategies. *Journal of Digital Learning Environments, 4*(2), 56–67.

[17] Thomas, L., & Marshall, S. (2022). Reimagining inclusive digital pedagogy in post-pandemic classrooms. *Journal of Inclusive Education, 12*(1), 17–32.

[18] Vitolo, K., & Isaac, L. (2023). The impact of hybrid learning on college students' attention. *Journal of Learning Analytics and Neuroeducation, 5*(1), 45–59.

[19] Wallace, J. E. (2023). The impact of remote learning on student engagement and academic performance during the COVID-19 pandemic. *Journal of Education and Teaching Methods, 2*(2), 20–32.

[20] Wang, S., Wang, T., Huang, Y., Su, X., & Wang, D. (2024). Hybrid teaching after COVID-19: Advantages, challenges and optimization strategies. *BMC Medical Education, 24*, 753. https://doi.org/10.1186/s12909-024-04970-5

.

fffff