Research Article

"Towards A Hybrid Future: Edtech Trends And Transformations In Education"

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ARTICLE INFO	ABSTRACT
	Knowing the current is crucial to better comprehend what the future of education will entail. The broad acceptance of online learning is a defining feature of the current EdTech landscape. The COVID-19 pandemic, which compelled schools to close and switch to remote learning, is to blame for this. The epidemic has sped up the adoption of technology in education, forcing many institutions, colleges, and universities to immediately switch to online education in order to guarantee that students may continue their education. Due to the rise in popularity of edtech firms among students who want to further their education online. These platforms provide a variety of courses on numerous subjects, including computer science, business, and history. They give pupils the freedom to study wherever they want, at their own pace. In the field of education, learning management systems (LMS) are also gaining popularity. Schools may deliver online courses and monitor student progress with the help of LMS platforms like Canvas, Blackboard, and Moodle. These systems give teachers the resources they need to organise assignments, generate and deliver online content, and give feedback to students. There are a wide range of other EdTech tools and services that are used in education in addition to online learning and LMS platforms. For example, virtual classes use video conferencing platforms like Zoom and Google Meet, and digital textbooks are gaining popularity as a more accessible and affordable option to traditional textbooks. This paper projects the future of the education sector amidst the rapid changes that are taking place in the teaching and learning environment. **Keywords:** Education sector, hybrid learning, learning management systems, online content, traditional methods

1. Introduction

With the rise of edtech businesses, the Indian educational scene has undergone a dramatic transition. These forward-thinking businesses are transforming education by adding gamification and interactive learning, creating customised learning experiences, and enhancing accessibility. Edtech businesses like BYJU'S, upGrad, Unacademy, Vedantu, Physics Wallah, Eruditus, and many others have changed how students study today, transforming the classroom learning experience into one that is more enjoyable and participatory. IBEF predicts that the Indian edtech sector will grow from $700−800 million in 2021 to $30 billion by 2031. India has surpassed the US to become the second-largest market for e-learning, according to KPMG. This article investigates how edtech startups are influencing education in many ways.

Understanding the present is essential for understanding what the future of education will involve. An important characteristic of the contemporary EdTech scene is the widespread adoption of online education. This is because of the COVID-19 pandemic, which forced schools to close and adapt to remote learning. In order to ensure that students can complete their education, the epidemic has accelerated the adoption of technology in education, compelling many institutions, schools, and universities to make the conversion to online learning right away. Because students who want to enhance their education online are becoming more and more popular with edtech companies. The courses offered on these platforms cover a wide range of topics, such as computer science, business, and history. These systems provide teachers with the tools they need to manage homework, create and distribute online content, and provide student feedback. In addition to online learning and LMS platforms, there are a large range of other EdTech technologies and services that are utilized in education. For

instance, online classrooms use video conferencing tools like Zoom and Google Meet, and digital textbooks are becoming more and more popular as an easier-to-use and more cost-effective substitute for traditional textbooks. In light of the quick changes in the teaching and learning environment, this article forecasts the direction of the education sector.
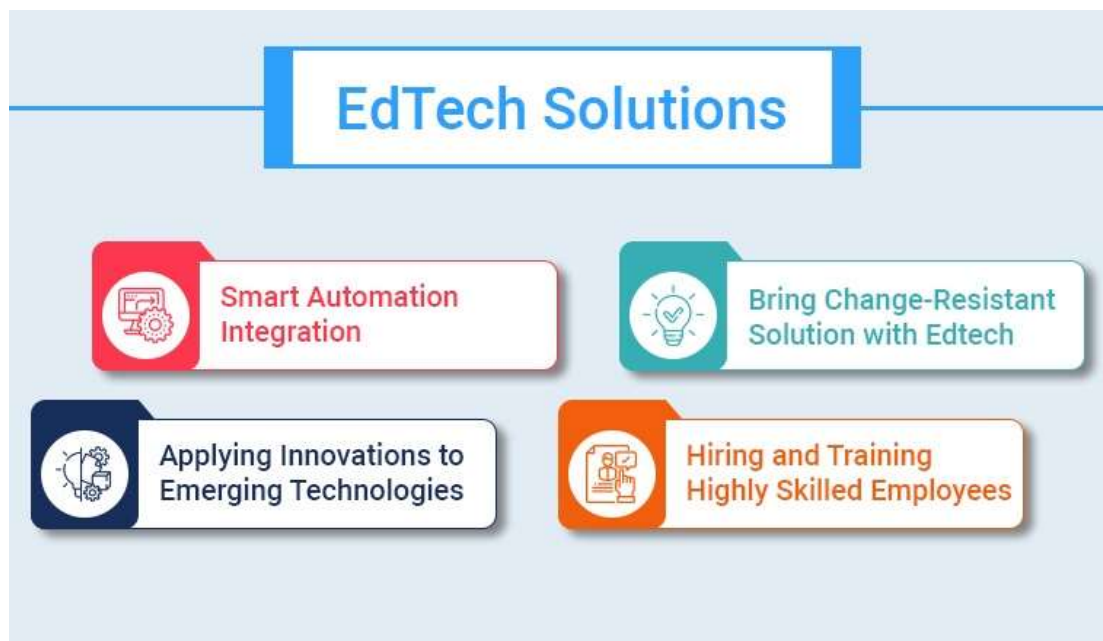

Figure1. Edtech Solution and Challenges

While traditional campus learning offers valuable benefits, it's unlikely to be the sole future of education. Here's why:

Accessibility Limitations: Traditional campus learning can be geographically restrictive and expensive, limiting access for those who live far away or can't afford on-campus living.

Limited Flexibility: The rigid schedules and in-person nature of traditional learning can be challenging for students with work or family commitments.

Pace of Learning: The one-size-fits-all approach of traditional classrooms may not cater to individual learning styles and paces.

However, traditional campus learning does have some irreplaceable advantages:

Social and Emotional Development: The campus environment fosters collaboration, peer-to-peer learning, and social interaction, which are crucial for developing soft skills and emotional intelligence.

Structured Learning Environment: The physical classroom provides a dedicated space for focused learning, which can be difficult to replicate in an online setting for some students.

Faculty Mentorship: The in-person interaction with professors allows for deeper mentorship, personalized guidance, and the ability to build stronger relationships with educators.

Research and blended learning

Blended learning (BL), the combination of face-to-face and online instruction (Graham 2013), is widely used in higher education and has been called the "new traditional model" (Ross and Gage 2006, p. 167) or the "new normal" in course delivery. Due to definitional vagueness (Oliver and Trigwell 2005) and institutions' incapacity to track a creative activity that often emerges organically, tracking its progress has been difficult. The Sloan Consortium (formerly the Online Learning Consortium) conducted a nationwide research that indicated 65.2% of IHEs provided blended (hybrid) courses (Allen and Seaman 2003). The U.S. Department of Education's 2008 research on remote education characterized BL as "a combination of online and in-class instruction with reduced in-class seat time for students" (Lewis and Parsad 2008, p. 1, emphasis added). The study indicated that 35% of higher education institutions provided blended courses and 12% of the 12.2 million distant education enrollments were in blended courses.

Blended learning designs were one of the short-term dynamics propelling higher education technology adoption in the next 1–2 years, according to the 2017 New Media Consortium Horizon Report (Adams Becker et al According to the EDUCAUSE Learning Initiative's 2017 annual survey of higher education, blended learning is a major teaching and learning challenge. As more schools study BL education, research on its effects on teachers and students grows. This modality is building a community of practice around the research question, "How is blended learning impacting the teaching and learning environment?" As researchers analyze

how BL interacts with cognitive, affective, and behavioral aspects of student conduct and its academy-changing potential, that question persists. Those issues are so compelling that several volumes have been dedicated to assembling research on blended learning (Dziuban et al. 2016; Picciano et al. 2014; Picciano and Dziuban 2007; Bonk and Graham 2007; Kitchenham 2011; Jean-François 2013; Garrison and Vaughan 2013), and at least one organization, the Online Learning Consortium, sponsors an annual conference solely dedicated to blended learning at all levels of education and training These initiatives cover blended learning in many scenarios. Contexts include K-12 education, industrial and military training, conceptual frameworks, transformational potential, authentic assessment, and innovative research approaches. Many of these resources address students' access, achievement, withdrawal, and impression of blended learning's effectiveness.

The US educational gap between underprivileged students and those with more money and technology is growing (Williams 2016). Equal education is essential, especially for marginalized communities. Can blended learning improve educational equality and access for low-income students? Most indicators say "yes" (Dziuban et al. 2004), but the answer is yet "to be determined." Many definitions of quality education make it difficult (Pirsig 1974; Arum et al. 2016). Quality Matters (2016), the OLC OSCQR Course Design Review Scorecard developed by Open SUNY (Open SUNY n.d.), the Quality Scorecard for Blended Learning Programs (Online Learning Consortium n.d.), and SERVQUAL (Alhabeeb 2015) have made progress, but the issue remains. We usually assign quality education to a course, educational program, or idea but don't know why. Searle (2015) concisely states that quality is observer-dependent. Pirsig (1974) presents the context in his classic work on quality, Quality exists, but defining it causes problems. You cannot" (p. 91). Thus, using syntax-based measures to define great education semantically yields surrogate models that are crude approximations and oversimplified, according to O'Neil (2017). Additionally, derived measures sometimes become goals or benchmarks, losing their measuring features (Goodhart 1975).

ICTs in society and education
Blended learning makes us think about digital technology and ICTs in particular. Floridi (2014) provides Alan Turing's answer: digital ICTs can process information independently like humans and other biological organisms. ICTs can communicate without human involvement as linked processes designed by humans. Humans should be "on the loop" (Floridi 2014, p. 30) inventing and adapting technology, not just "in the loop" anymore. We see the world increasingly as information than as physical objects (Floridi 2008). Education is increasingly dominated by information, and our economies depend on it. Our world is mixed so thoroughly that we can't see its parts. Floridi (2014) claims that humans live in a "infosphere" (like biosphere) as "inforgs." We are moving from physical and unchanging to interactive realities.

Floridi helps us identify the next education blend combining ICTs or specialist AI (Floridi 2014, 25; Norberg 2017, 65). If interfaced well, learning analytics, adaptive learning, calibrated peer review, and automated essay scoring (Balfour 2013) can help teachers focus on human traits like caring, creativity, and problem-solving. As with any technological advances, this can save resources and improve teaching. If artificial intelligence can help teachers provide kids more individualized feedback and coaching, we will have accomplished a breakthrough. The Edinburg University online teaching manifesto boldly states, "Automation need not impoverish education – we welcome our robot colleagues" (Bayne et al. 2016). They can teach us about ourselves and education's humanity if used appropriately. This new blend will alter curricular and policy questions like what? and what for? The new schooling normal will change constantly. Floridi's (2014) concept helps us understand and control events rather than just watching. He handled the new blended learning norms in several ways.

2. Literature review

Kumar et al. (2021) state that through adaptable online information and communication technology, fewer students in congested classrooms, and structured teaching and learning experiences, blended learning includes online learning activities and aids students in receiving meaningful education. This study has done surveys of numerous blended learning tools, approaches, frameworks, and models. The experiences of students, teachers, and administration in blended learning courses during COVID-19 and the years prior to COVID-19 are thoroughly surveyed in this paper. As a result, blended learning has been found to be beneficial for formal education in schools, universities, and workplaces. In recent years, a wide range of online and e-learning platforms have been created that can be used in blended learning to enhance the abilities of the learner.

Vallee et al. (2020) found that when blended learning was compared to traditional learning in the field of health education, the effects on knowledge outcomes were consistently better. These findings need to be confirmed by more research, which should also examine the usefulness of various blended learning design options.

Hrastinski (2019) claim that although the phrase "blended learning" is commonly used, its definition is unclear. What does the term "blended learning" mean? We're merging, but what, how, and why? Different definitions, paradigms, and conceptualizations of blended learning are examined in this paper along with their ramifications. The literature refers to virtually all forms of education that incorporate some combination of face-to-face and online learning as blended learning due to its inclusive definitions, models, and conceptualizations. The phrase "blended learning" has gained currency. Although these blends do not adhere

to popular definitions of blended learning, the term "blended learning" is often used to describe other blends, such as the blending of various instructional methods, pedagogical approaches, and technological platforms.

Bruggeman et al. (2021) state that although satisfying students' requirements for flexibility is one benefit of blended learning in higher education, putting it into practice is still a difficult task. Since the teacher is at the center of every educational transformation process, the current qualitative study examines critical teacher characteristics for implementing blended learning from the viewpoint of specialists.

Dakhi et al. (2020) observe that the education system has undergone significant change as a result of the rapidly expanding use of technology, and both students and lecturers now possess better digital abilities. Additionally, technology can affect how we think, learn, and communicate. In order to provide a dynamic learning environment, technological advancements push educators to comprehend and apply technology in teaching and learning activities.

Puspaningtyas & Ulfa (2021) state that the purpose of this study is to describe how students feel about the usage of video animation in blended learning. 28 students from the Management Study Programme at Universitas Teknokrat Indonesia served as the study's subjects. According to the study's findings, students said that blended learning makes it easier to absorb the information. The respondents said that they may participate actively in lectures, gaining confidence and developing independence. Learning is supposed to be more enjoyable through blended learning that incorporates animated films. More than 90% of students claimed that having a tutor explain the topic in the video would help them comprehend the online course material. The experts claim that using animated movies in blended learning might boost student motivation and foster students creativity.

Bouilheres et al. (2020) studied sixty-six students enrolled in eight Blended Learning courses providing information via an online survey that was created based on a list of validated questions. The argument that the Blended Learning environment in each of the students' classes positively impacted their perception of their university learning experiences is supported empirically by the analysis of the survey findings. The engagement, flexibility of learning, online learning experience, and self-confidence factors are identified as distinct factor structures across survey questions using factor analysis utilizing the oblique rotation approach. Significant disparities in the clusters' responses to these characteristics also suggest that students' perceptions of the advantages of blended learning and their prior exposure to this methodology vary.

Ma and Lee (2021) in their findings demonstrated that mixed learning outperformed pure online learning in terms of improving students' feelings of focus, self-assurance, and contentment. In comparison to face-to-face learning, blended learning had a higher degree of perceived satisfaction. To gain a deeper insight of how blended learning motivated students throughout the learning process, follow-up interviews were also conducted. The results of the current study offer evidence to support the efficacy of the blended learning strategy in meeting students' motivating demands, taking into account that blended learning may become the new norm in higher education following the Covid-19 pandemic.

Shamsuddin and Kaur (2020) found no appreciable distinction in students' learning preferences and attitudes towards blended learning. The study's conclusions should help academicians create more appropriate coursework in accordance with students' preferred learning styles, such as more practical assignments for Convergent groups, which are thought to raise students' achievement.

Mali and Lim (2021) demonstrates that students think Face-to-face (F2F) is better than Blended Learning (BL) because social components that are expected in an F2F context might not be incorporated into netiquette frameworks. From a policymaking perspective, we support integrating social components into BL to improve the learning environment and reduce students' unfavourable perceptions of the switch from F2F delivery to online/BL. We offer suggestions for how to incorporate social components into netiquette frameworks practically.

(Garrison and Kanuka 2004; Picciano 2009). Several researchers have put up an extensive agenda of ground-breaking and creative research questions related to blended learning that could improve efficacy When compared to face-to-face courses, research generally shows that BL improves student achievement and satisfaction (Dziuban and Moskal 2011; Dziuban et al. 2011; Means et al. 2013) as well as students' feeling of community (Rovai and Jordan 2004). The importance of institutional support for course redesign and planning is emphasized by those who have had the most success with blended learning efforts (Moskal et al. 2013; Dringus and Seagull 2015; Picciano 2009; Tynan et al. 2015). Long and complex research questions with varying definitions of "blended learning" can be found in the literature. This makes it necessary to conduct ongoing, in-depth research on the instructional models and support that are necessary to maximize success and achievement (Dringus and Seagull 2015; Bloemer and Swan 2015).

Based on the literature reviewed following projections are made for the features of the education sector:

1. Personalised Instruction: The most cutting-edge technology is personalization in education. By customising learning opportunities for each student, edtech entrepreneurs are reinventing traditional classroom environments. Students can access individualised content, advance at their own pace, and get real-time feedback thanks to platforms that are powered by adaptive algorithms and artificial intelligence (AI). This strategy increases learning outcomes by raising motivation and increasing student involvement.

2. Inclusivity and Accessibility: Ensuring that everyone has equal access to high-quality learning opportunities is one of the system's major problems. Students from various backgrounds and locations can access educational resources thanks to online learning platforms, smartphone applications, and remote learning technologies. Through the provision of previously inaccessible educational opportunities, edtech businesses are also strengthening underserved populations.
3. Interactive Learning and Gamification: To make learning more interesting and enjoyable, startups are implementing gamification and interactive learning strategies. Students can take part in interactive exercises, challenges, and simulations by incorporating game components into the course material. This method encourages student collaboration, active learning, and problem-solving abilities. Edtech entrepreneurs are converting classrooms into vibrant, engaging learning environments through gamified platforms.
4. Data-driven Perspectives: Enhancing teaching strategies and raising student achievement depend heavily on data analytics. Edtech firms use data to gather insightful knowledge about student performance, learning trends, and areas for development. Teachers can tailor lessons, spot learning gaps, and offer focused interventions by examining student data. This data-driven strategy equips teachers with the knowledge they need to decide wisely and maximise each student's learning opportunities.
5. Emerging Technologies: The future of edtech is being shaped by the quick development of new technologies like artificial intelligence (AI), virtual reality (VR), and augmented reality (AR). Interactive simulations provide hands-on investigation, VR and AR applications give immersive learning experiences, and chatbots driven by AI offer immediate tutoring and help. Innovative and exciting learning environments are being created by edtech firms, who are leading the charge in integrating these technologies into educational settings.

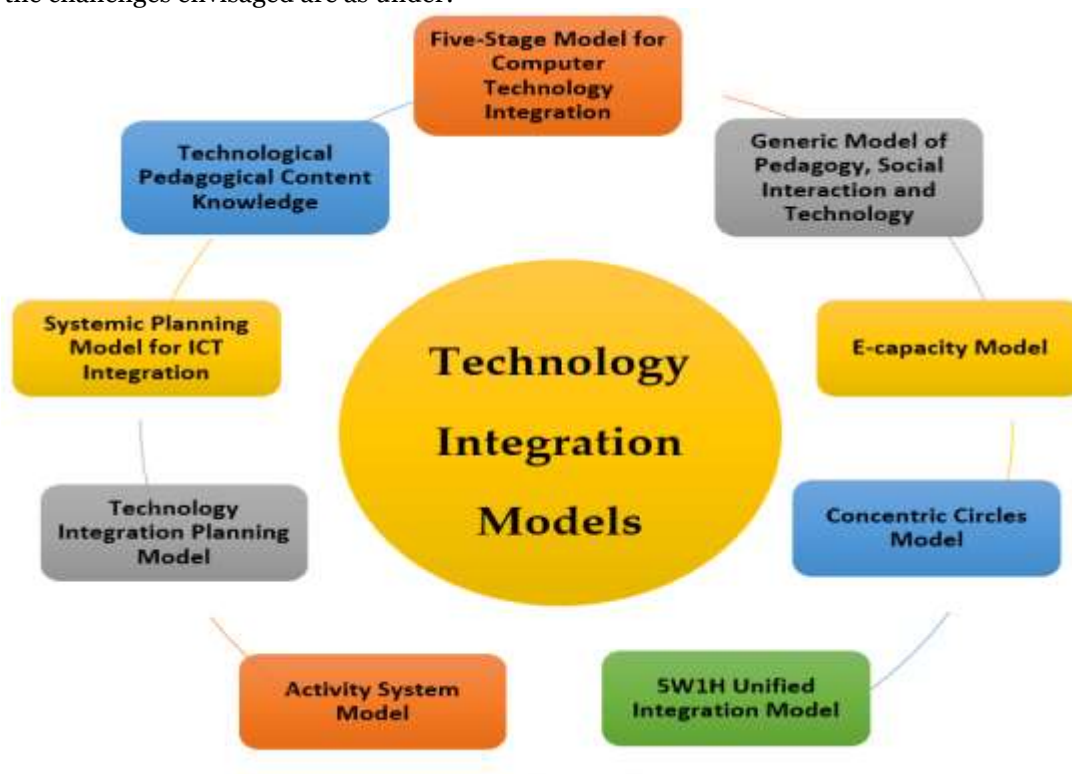Some of the challenges envisaged are as under:

Figure 2. Technology Integration Models

1. Integration with conventional educational systems: The integration of their cutting-edge technologies into conventional educational settings is one of the major difficulties faced by edtech businesses. Teachers, institutions, and policymakers used to traditional ways may reject the implementation of new technologies and teaching methods. To close the gap between edtech firms and educational institutions, cooperative efforts are required, forging collaborations, offering training, and building welcoming settings for successful integration.
2. Data security and privacy: The protection of data privacy and security is becoming increasingly important as edtech businesses collect and analyze enormous volumes of student data. Maintaining confidence and ensuring ethical practises need the safeguarding of sensitive information and adherence to data protection laws. To protect student privacy, edtech companies must put in place strong security measures, secure the necessary consent, and create transparent rules. These difficulties can be reduced by working with regulatory organizations and embracing data privacy standards.

3. Addressing the digital divide: Edtech has the potential to democratize education, but there is still a big problem with the digital divide. The implementation of these solutions is also hampered by inequalities in access to technology and internet connectivity. Governments, educational institutions, and edtech entrepreneurs must work together to close this gap. Efforts to address these issues and guarantee inclusivity include delivering affordable devices, expanding internet connection to underprivileged areas, and creating content for low-bandwidth settings.
4. Support and training for teachers: Ample teacher support and training are essential for successfully implementing edtech solutions. In order to properly use technology in the classroom, educators must be well-versed in it. Teachers can be empowered to embrace new teaching approaches, incorporate edtech tools, and use data-driven insights to improve student learning outcomes through professional development programmes, seminars, and continuous support. Comprehensive teacher training programmes can be made possible by cooperation between edtech firms and educational organizations.
5. Sustainable growth and scalability: Startups in the education industry frequently struggle with sustainability and scalability issues. Key factors include creating and maintaining a solid technological foundation, offering constant upgrades and support, and ensuring financial viability. In order to increase operations, broaden reach, and ensure long-term sustainability, partnerships with investors, education-focused groups, and governmental authorities can provide the required resources and assistance.

Educational Availability

Even with new educational technology, there is still a problem with access to innovations and technologies for education (often referred to as the "digital divide"; Fairlie 2004; Jones et al. 2009). Online technologies provide the potential to expand educational opportunities for underprivileged and nontraditional students by providing a plethora of educational resources and experiences to individuals who may have restricted access to on-campus higher education. Low socioeconomic status students are less likely to pursue higher degrees of postsecondary education, according to a 2010 U.S. report (Aud et al. 2010). Nonetheless, millions of people now have access to educational possibilities thanks to the growing availability of distant learning (Lewis and Parsad 2008; Allen et al. 2016). Furthermore, recent efforts to prioritize open educational resources (OER) have led to notable cost savings without compromising student performance (Robinson et al. 2014; Fischer et al. 2015; Hilton et al. 2016).

Regretfully, not all demographic groups may gain from access in the same way. Researchers in 2015 discovered that even after adjusting for academic preparation, citizenship, socioeconomic status (SES), and English as a second language (ESL) status, STEM majors who were Hispanic and Black were far less likely to enroll in online courses (Wladis et al. 2015). Furthermore, it has been questioned if underprivileged groups have benefited from the increased access provided by online technologies. According to a California Community Colleges Chancellor's Office report from 2013, all ethnic minorities completed distance education courses at a lower rate than the ethnic majority, with the exception of Asian/Pacific Islanders. African American community college students who enrolled in distance education courses completed their degrees at much lower rates than those who did not, according to Shea and Bidjerano's (2014, 2016) findings. However, just one out of fifteen courses demonstrated statistically significant differences in student test scores for ethnic minorities, according to a study on success factors in K–12 online learning (Liu and Cavanaugh 2011). Further investigation is warranted to explore the accessibility and success rates of learning in various modalities, such as entirely online and mixed learning settings, for diverse groups.

Defining a therapeutic outcome The impact of blended learning environments and their link to learning effectiveness have been the subject of at least five meta-analyses conducted over the past ten years (Zhao et al. 2005; Sitzmann et al. 2006; Bernard et al. 2009; Means et al. 2010, 2013; Bernard et al. 2014). All of these research, which contrasted entirely online or traditional face-to-face settings with blended learning, discovered small to moderate positive impact sizes in favor of blended learning. Nonetheless, a number of factors included in these research affect our comprehension of the results' generalizability.

After analyzing the meta-analyses carried out by Means and her colleagues (Means et al. 2013; Means et al. 2010), Dziuban and colleagues (Dziuban et al. 2015) came to the conclusion that their methodologies were excellent because they used scale-free effect size indices and included a wide range of studies. Both papers concluded that courses using online modalities, especially blended courses, showed a slight difference in numerous outcome measures. These studies do raise certain problems, though, particularly with blended learning. In order to ensure that there is nothing else happening in the blending that could skew the results, the effect sizes are first based on the linear hypothesis testing model with the underlying assumption that the treatment and the error terms are uncorrelated. Despite the rigorous vetting of the blended learning publications (Means et al. 2010), these meta-analysis studies should be viewed extremely cautiously because the assumption of independence is questionable at best.

Additionally, there is a worry regarding blended learning. Because of the way they are configured, blends are not equal. The following blending techniques, for example, can be found, at the very least, by closely examining the sources used in the Means, et al. papers: computer laboratories, class websites, email, online instruction,

mapping and scaffolding tools, computer clusters, interactive presentations and email, handwriting capture, evidence-based practice, electronic portfolios, learning management systems, and virtual apparatuses. These course configuration methods are not equal, and the confusion we describe is the result of this nonequivalence. Here, we contend that blended learning is not, in the statistical sense, a treatment effect, but rather a general construct in the form of a border object (Star and Griesemer 1989). That is, a notion or idea that can facilitate a community of practice but lacks clarity, leading to discord within the larger group. On the other hand, it is more powerful inside certain constituencies. For example, because of widely accepted teaching and learning principles, content fields (education, rhetoric, optics, mathematics, and philosophy) develop a more defined definition. Put simply, after Tolstoy, as Leonard Smith (2007) notes, the situation is more nuanced than that. "Every nonlinear system is unique in its own way, and all linear models are similar to one another" (p. 33). While effect sizes linked to blended learning should be taken cautiously when the influence is assessed inside a specific learning setting, these research are by no means invalidated.

3. Conclusion

The study highlights the transformative impact of EdTech startups on the education sector, particularly in India, where companies like BYJU'S, upGrad, and Unacademy are reshaping the learning landscape. The widespread acceptance of online education, accelerated by the COVID-19 pandemic, has catalyzed this shift towards digital learning platforms, learning management systems (LMS), and various other EdTech tools.

Blended learning, a combination of face-to-face and online instruction, has emerged as a significant trend in higher education, offering flexibility and personalized learning experiences. However, challenges such as defining blended learning, ensuring teacher preparedness, and addressing the digital divide remain pertinent. The study also emphasizes the need for personalized instruction, inclusivity, and interactive learning experiences facilitated by emerging technologies like AI, VR, and AR. Despite the potential benefits, integrating EdTech into traditional educational systems, ensuring data security and privacy, and providing adequate support and training for teachers pose significant challenges.

Additionally, the study acknowledges the digital divide and the disparities in access to online education, particularly among underprivileged and minority groups. It calls for further research to explore the effectiveness and accessibility of blended learning environments for diverse student populations.

Overall, the study underscores the evolving nature of education driven by technological advancements and the imperative for stakeholders to address both the opportunities and challenges presented by EdTech integration.

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