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Research Article

Student Perception of EdTech Platforms and Their Impact on Learning Outcomes of Students of Higher Education in Mumbai

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Abstract: The rapid expansion of Educational Technology (EdTech) platforms has significantly transformed the delivery and accessibility of higher education in India, particularly in the post-pandemic era. As digital learning becomes increasingly integrated into mainstream education, understanding students' perceptions and evaluating the effectiveness of these platforms have become essential for educators, institutions, and policymakers. This study aims to examine the perceptions of higher education students in Mumbai towards EdTech platforms and explore their perceived impact on learning outcomes. The research seeks to investigate students' awareness and usage patterns of various EdTech platforms, evaluate their perceptions regarding the quality, accessibility, usability, and effectiveness of these platforms, and assess their influence on academic performance, conceptual understanding, and skill development. It also intends to identify the key factors motivating students to adopt EdTech as well as the barriers limiting its effective utilization. Furthermore, the study proposes to compare students' perceptions of EdTech-based learning with traditional classroom instruction to understand the role of digital learning in higher education. The study adopts a descriptive research design based on both primary and secondary data. Primary data will be collected through a structured questionnaire administered to higher education students across Mumbai, while secondary data will be obtained from academic literature, government reports, and industry publications. The collected data will be analysed using descriptive statistical techniques to identify patterns and trends. The findings of this study are expected to provide valuable insights for educational institutions, EdTech companies, and policymakers in designing more effective, accessible, and student-centric digital learning ecosystems while supporting the development of blended learning models in higher education.

Keywords: Educational Technology (EdTech), Higher Education, Student Perception, Learning Outcomes, Blended Learning, Digital Education, Mumbai

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INTRODUCTION

Background: The Digital Transformation of Education in India

The education sector in India is currently experiencing a paradigm shift and it is facilitated by the fast adoption of digital technology by all socio-economic groups. India has the infrastructures required to make digital learning scalable and accessible with more than 500 million smartphone users as of 2024 and with an internet user base of more than 900 million. One of the newest and most rapidly expanding sectors in the Indian economy has been the EdTech industry the industry of platforms that provide educational content, skill development, examination preparation, and degree programmes by means of the digital media. After the COVID-19 pandemic, where educational institutions in the country were forced to switch their mode of delivery at night to an online one, there was an unprecedented increase in the usage of EdTech in Indian students. What started as a panic-induced transition has in most instances become a prolonged change of behaviour in the way students pursue academic material in higher education.

Being the financial capital of India with one of the most educationally active cities, Mumbai has hundreds of colleges and universities, which are members of the University of Mumbai, as well as the prestigious professional schools and

colleges. The young, digitally-linked, and economically diverse (between the lower-middle and upper-class households) student population of the city is represented. Such students are a perfect sample to investigate the patterns of EdTech adoption, as they have access to the traditional and digital learning options and are demanding when it comes to the quality of learning services.

What is EdTech? Scope and Key Platforms

Educational technology or EdTech is the general application of electronic tools, platforms, and systems to support, improve, or provide the learning experience. When applied to the broader context of this paper, EdTech can be described as covering a very broad range of platforms, such as free resource archives, like YouTube or Khan Academy; subscription-based Indian-based platforms, like BYJU, Unacademy and Vedantu; global online marketplaces, like Coursera and Udemy; professional development platforms, like LinkedIn Learning; and institutional Learning Management Systems (LMS), such as Google Classroom, Moodle, and Microsoft Teams. All of these platforms take a unique place in the learning ecosystem of the student - some of them are complements to the formal college education, others are certification-based skills training, and others are pure supplementary revision or doubt-solver.

India The EdTech in India is estimated to be USD 7.5 billion in 2023 and is expected to grow to USD 30 billion in 2031 with a CAGR of more than 19 (IBEF, 2023). The government has encouraged this expansion through policies like the National Education Policy (NEP) 2020 which clearly recommends adopting technology in education and the digital infrastructure initiatives like the SWAYAM and the DIKSHA that offer online learning resources that are supported by the government. This is an explosive growth, but questions of what the actual effect of EdTech platforms on learning outcomes is, whether it substantially improves academic performance, conceptual understanding, and skill development, or whether it is simply a question of convenience and pandemic necessity as opposed to pedagogical purport.

Significance of the Study

The academic literature on the influence of EdTech platforms on students at the Indian higher education level is in its initial phase. The bulk of the literature is either school level researchers, or international university researchers, or aggregate market researchers which do not reflect the detailing perceptions and behavioural patterns on individual higher learning students in specified urban environments. The paper is an addition to the body of literature as it provides empirical, survey-based data on perceptions and patterns of use and students self-assessed learning outcomes of 100 higher education students in Mumbai at the undergraduate, postgraduate, and professional programme levels.

Objectives of the Study

- To understand the awareness and usage patterns of EdTech platforms among higher education students in Mumbai.
- To examine student perceptions regarding the quality, accessibility, and usability of EdTech platforms.
- To assess the impact of EdTech platforms on academic performance, conceptual understanding, and learning outcomes.
- To identify key motivators and barriers influencing EdTech adoption among Mumbai's higher education students.
- To compare the perceived effectiveness of EdTech-based learning with traditional classroom learning.
- To provide strategic recommendations for EdTech companies, educational institutions, and policymakers.

Scope and Limitations

The academic literature on the influence of EdTech platforms on students at the Indian higher education level is in its initial phase. The bulk of the literature is either school level researchers, or international university researchers, or aggregate market researchers which do not reflect the detailing perceptions and behavioural patterns on individual higher learning students in specified urban environments. The paper is an addition to the body of literature as it provides empirical, survey-based data on perceptions and patterns of use and students self-assessed learning outcomes of 100 higher education students in Mumbai at the undergraduate, postgraduate, and professional programme levels.

LITERATURE REVIEW

EdTech and Learning: Global Evidence

The interaction of technology and learning has been an issue of scholarly pursuit over a number of decades. Initial studies on computer based instruction have shown that technology mediated learning had the potential to enhance student engagement, retention and performance given the appropriate environment (Kulik and Kulik, 1991). The occurrence of the internet and web-based learning platforms resulted in a significant growth of this body of evidence. In a comprehensive meta-analysis that the U.S. Department of Education commissioned, Means et al. (2013) discovered

that online learning offered slightly more effective results as compared to face-to-face instruction, with the blended or hybrid models showing the best results. They, however, warned them that this could largely depend on the design of the instruction, student motivation and the type of learning task.

The 2010s have brought a new aspect to the field of EdTech research with the introduction of Massive Open Online Courses (MOOCs) and on-demand video services. Although other platforms, like Coursera and edX, also experienced impressive scale, with millions of enrollees around the world, completion rates stayed continuously low, ranging between 5 and 15 percent on average courses (Jordan, 2014). This high enrolment, low completion paradox has been traced to lack of external accountability systems, insufficient social learning opportunities and self-discipline requirements of asynchronous learning all of which are directly applicable to the challenges as found in the responses of the respondents in this study.

EdTech in Indian Higher Education

The EdTech market in India has grown swiftly in response to its initial emphasis on the preparation of test scores at K-12 (as seen with the initial growth of BYJU's and Unacademy) to a more diverse ecosystem of higher education and professional skilling and lifelong learning. According to the study of the Internet and Mobile Association of India (IAMAI, 2022), the adoption of online education in Indian colleges in 2021 grew more than 200 percent compared to 2019, mainly due to the pandemic. According to a survey by the All India Council of Technical Education (AICTE, 2021), students appreciated the flexibility of EdTech sites and the variety of content in platforms, but a good percentage expressed that they are struggling to remain motivated and disciplined in online learning, which is also supported by the data in this study.

Researches on particular Indian platforms have provided subtle results. Rai (2021) discovered that the users of BYJU in urban India had better conceptual clarity in mathematics and science, yet the results were observed to be better among those who had a consistent internet connection and were digitally literate. In their study, Sharma and Gupta (2022) investigated how YouTube is used as a learning aid among students at Delhi University and found that 68% of the participants were able to achieve a better idea of lecture material but less than 30% of them were able to show skill application in the form of an additional tool of learning, thus a discrepancy between the idea of passive learning and active learning.

Theoretical Frameworks Relevant to EdTech Adoption

A number of theoretical frameworks have been used to understand the issue of EdTech adoption and effectiveness. The Technology Acceptance Model (TAM) that was firstly introduced by Davis (1989) assumes that the perceived ease of use and the perceived usefulness are the two main factors that define the intention of an individual to use the new technology. TAM offers a hypothesis in the EdTech environment where students who perceive platforms as easy to use and academically beneficial will more readily and consistently adopt them, which is the hypothesis that was examined in this research using Likert Scale items about platform perceptions regarding ease of use and academic usefulness.

A complementary motivational theory is the Self-Determination Theory (SDT, Deci and Ryan, 1985). SDT has it that human beings are best engaged and active in the learning process when three fundamental psychological needs are achieved: autonomy (sense of control over his/her learning), competence (feeling capable and making progress), and relatedness (connection with other people and instructors). EdTech platforms receive a high score on autonomy (self-paced learning is the second most appreciated feature among the responders in the survey) (24), yet there is a problem with providing the feedback on relatedness and competence without face-to-face interaction with the instructor.

The Constructivist Learning Theory (Vygotsky, 1978) is also applicable, though especially the theory of the Zone of Proximal Development (ZPD), which states that learning is optimally performed when a learner is challenged a step above his or her current level of autonomous ability. Adaptive content, real-time feedback, and the utilization of intelligent doubt resolution features of EdTech platforms are more consistent with constructivist values than mere video lectures which should be considered when designing the platform and choosing it based on institutional requirements.

Blended Learning: The Emerging Consensus

There is an increasing amount of literature in the world and in India which indicates that blended learning, the coherence of online and in-person learning, is the most appropriate modality in higher education. According to Singh (2021), students enrolled in blended learning programs in Indian universities had been shown to show superior academic achievement, increased participation and self-control in comparison to either all online or all classroom-based groups. This is also supported by the results of this study since half of the respondents indicated that blended learning was their favorite learning model, which was extremely high compared to the preferred unit of learning.

Gap in Existing Literature

Although the amount of EdTech studies in India is increasing, the number of studies analyzing the perceptions and learning outcomes of higher education students in Mumbai through various educational levels and fields in primary survey data is scarce. Most of the available research on Indian EdTech is platform-specific, or geographically more extensive (pan-India) or centered on school-level or competitive exam preparation environments. This study fills that gap.

THEORETICAL FRAMEWORK AND RESEARCH METHODOLOGY

Theoretical Framework

The paper is grounded on three theoretical perspectives. The analysis of perceived ease of use and usefulness as factors that influence the adoption and the further use of EdTech platforms is directed by the Technology Acceptance Model (Davis, 1989). The analysis of motivational dimensions, especially autonomy with the self-paced learning, competence with the performance improvement, and the corresponding relatedness deficit caused by the lack of peer and instructor interaction on the digital platforms is informed by the Self-Determination Theory (Deci and Ryan, 1985). To assess the ability of the EdTech platform to facilitate active and application-based learning or passive content consumption, the pedagogical framework to consider is Constructivist Learning Theory (Vygotsky, 1978).

Research Design

This study took the form of descriptive research design. The design used is suitable in a systematic recording and measurement of student perceptions, patterns of use, and self-reported learning outcomes of EdTech adoption. They have utilized both primary and secondary sources of data. Secondary data collection was done in the form of academic journals, government education reports, industry publications, and EdTech market research reports. The structured questionnaire was used to gather primary data on 100 higher education students in Mumbai.

Primary Data Collection

A questionnaire consisting of 33 questions in seven sections was created, which included demographic information about respondents, awareness and usage behaviour of EdTech (10-item Likert scale), perceptions of the platform (10-item Likert scale), impact on learning (8-item Likert scale), comparison with classroom learning (5-item Likert scale), motivators, and barriers, and open-ended qualitative feedback. The questionnaire was sent online through Google Forms to the students of the higher education establishments of Mumbai, including those who are undertaking undergraduate, postgraduate/MMS and professional programmes.

Sampling

The convenience sampling was used. The study sample size of 100 valid respondents will include 47 percent who are in pursuit of PG/MMS, 31 percent UG students, 13 percent completed the course of PG/MMS and 9 percent students pursuing a professional course. The age composition of the sample was majorly 2225 years (46) and 1821 years (32) with 57 percent of the female respondents and 40 percent males. The most common were Commerce&Management (37%), and Engineering/Architecture (21%). The geographic dispersion of Western Suburbs (30 percent), Eastern Suburbs (23 percent), Central Mumbai (20 percent) and Navi Mumbai/Thane (19 percent) gives a fairly representative coverage of the diverse students in Mumbai.

Data Analysis

In this research, descriptive statistics is used in all data analysis. Categorical variables are summarised using frequency distributions and percentages. Weighted average on a scale of 1 to 5 is calculated on each Likert scale. Likert scale questions (Q18, Q27) are analysed with the help of mean scores and percentage distributions. No sophisticated statistical analysis has been implemented like regression, chi-square and correlation. All the results are in tabulated form clearly labelled and then explained narratively.

DATA ANALYSIS AND INTERPRETATION

Respondent Profile

Table 1 Presents the demographic profile of the 100 survey respondents. The sample is skewed towards the 18-25 age group (78%), which is the core higher education group in Mumbai. Most of them are undertaking either PG/MMS (47% or UG (28%) courses, but Commerce&Management course is the most common (37%). There are a more-to-upper income distribution of monthly household incomes, with 75% of all respondents reporting household incomes higher than Rs.25,000 per month, implying that there is fair digital access but at the same time that there is affordability to subscription-based services.

Table 1: Demographic Profile of Respondents (n = 100)

Variable	Category	Frequency	Percentage (%)
Age Group	22–25 years	46	46.0
	18–21 years	32	32.0
	26–30 years	13	13.0
	Above 30 years	9	9.0
Gender	Female	57	57.0
	Male	40	40.0
	Non-Binary / Prefer not to say	3	3.0
Education Level	PG / MMS — Pursuing	47	47.0
	UG — Pursuing	28	28.0
	PG / MMS — Completed	13	13.0
	Professional Course	9	9.0
	UG — Completed	3	3.0
Stream	Commerce&Management	37	37.0
	Engineering / Architecture	21	21.0
	Science&Technology	17	17.0
	Arts&Humanities	12	12.0
	Law / Medical / Other	13	13.0
Area	Western Suburbs	30	30.0
	Eastern Suburbs	23	23.0
	Central Mumbai	20	20.0
	Navi Mumbai / Thane	19	19.0
	South Mumbai	8	8.0
Monthly Income	Rs.1,00,001–Rs.2,00,000	26	26.0
	Rs.50,001–Rs.1,00,000	25	25.0
	Rs.25,001–Rs.50,000	24	24.0
	Below Rs.25,000	14	14.0
	Above Rs.2,00,000	11	11.0

EdTech Platform Usage and Awareness

The statistics indicate that there is a high overall awareness: 49% of the participants are quite aware of EdTech platforms and actively use them, and 36% know about them but rarely use them. Only 4% report no awareness. Regarding the usage of the platform, the most popular one was the College LMS (Google Classroom/Moodle/MS Teams) (64 users), then came the YouTube as educational content (60), Khan Academy (52), Udemy (51), and Coursera (45). The Indian sites (BYJU (30) and Unacademy (31)) followed the international sites, which may have been due to the higher price of Indian subscriptions to EdTech compared to the free international sites.

Results of the usage frequency show an intermediate frequency of use: 30 percent use EdTech platforms 3-4 times per week, 15 percent use them every day, and 18 percent use them infrequently and 18 percent not at all. When it comes to hours, 27% of them use EdTech less than one hour a week - an indicator of supplementary use, contrary to primary. Purpose-wise, the most common top three use cases are the purpose of better understanding of lecture topics (72 respondents), exam preparation (67), and doubt-solving (67), which proves that EdTech is actually a complement and not a substitute to formal instruction. The greatest number of respondents (43 percent) use smartphones as the primary access device, which supports the significance of mobile-first design in EdTech platforms in India. Interestingly, 56 percent use free platforms alone, and 14 percent have never used an EdTech platform at all, which should serve as an important indicator of obstacles to paid usage.

Student Perception of EdTech Platforms — Likert Scale Analysis

Table 2 Presents the weighted averages and response distributions for the ten perception statements. The perception statement with the greatest rating was EdTech platforms provide a greater number of learning resources than my college (avg 4.17), 82 percent of them agreed with this statement, which is a direct confirmation of the value of EdTech as a resource supplement. Other items such as; more engaging and interactive than textbooks (avg 4.13) and Visual and audio quality enhances understanding (avg 4.10) also scored high, and this confirms that the multimedia content of EdTech appeals to the students. The value of autonomy as a motivator of EdTech engagement is again substantiated by Control over Learning cooperation (avg 4.07), which is again in line with the Self-Determination Theory.

Yet, some of the dimensions were found to be reservations. There was a medium value of reliability on content quality of 3.57 with 45 percent of the students being neutral, indicating that EdTech content is appreciated by students but they have not completely resolved their concerns regarding the academic rigour of the same against institutional sources. Credibility of instructor was also rated at 3.56 with 35 percent of the respondents being neutral. Accessibility

Table 2: Student Perception of EdTech Platforms

Statement	SA%	A%	N%	D%	SD%	Avg
More engaging&interactive than textbooks	40	40	13	7	0	4.13
Offers wider variety of learning resources	39	43	14	4	0	4.17
Visual&audio quality enhances understanding	39	34	25	2	0	4.10
More control over learning pace	42	29	23	6	0	4.07
Easy to navigate&user-friendly	29	36	28	7	0	3.87
Affordable&good value for money	27	29	34	10	0	3.73
Quality of content is reliable&sound	22	24	45	7	2	3.57
Trust credentials of instructors	13	42	35	8	2	3.56
Better doubt resolution than classroom	14	30	34	16	6	3.30
Accessible with limited connectivity	11	30	31	26	2	3.22

Likert Scale (n = 100), SA: Strongly Agree, A: Agree, N: Neutral, D: Disagree, SD: Strongly Disagree

Table 3: Impact on Academic Performance (n = 100)

Question	Response	Frequency	Percentage (%)
Academic performance change	Slightly improved	42	42.0
	Remained the same	28	28.0
	Significantly improved	13	13.0
	Not applicable	9	9.0
	Slightly declined	8	8.0
Helped with projects/assignments	Yes, to some extent	37	37.0
	No difference	26	26.0
	I do not use EdTech for work	15	15.0
	No, it has not helped	14	14.0
	Yes, significantly	8	8.0
Conceptual clarity rating (avg 1-5)	Mean score	—	3.49

Table 4: Learning Outcomes

Statement	SA%	A%	N%	D%	SD%	Avg
Better revision&review of course content	14	45	31	10	0	3.63
Improved understanding of difficult concepts	15	33	37	13	2	3.46
Learn at own pace — suits learning style	15	31	35	19	0	3.42
Skills beyond college curriculum	9	36	33	14	8	3.24
Reduced classroom dependence	4	16	29	32	19	2.54
Apply theory practically	13	34	29	18	6	3.30
Exam confidence increased	10	26	40	17	7	3.15
Time management&self-discipline improved	16	18	34	27	5	3.13

Likert Scale (n = 100)

in limited internet connectivity had the lowest score of 3.22 and 28% of the respondents disagreed, which is a very practical hindrance in a city where the quality of internet connections falls behind geographic and income groups. The capability of resolving doubt also had a moderately low score of 3.30 and 22 percent disagreed that EdTech was better in resolving doubt than classroom instruction.

Impact on Learning Outcomes

Table 3 Presents the impact on academic performance and project assistance findings. Only 55 percent of the respondents say their academic performance has been improved since using EdTech platforms, 13% strongly and 42% moderately. Though, 28% claim no change and 8% claim slight decrease, it is possible to conclude that EdTech integration does not necessarily result in academic gains and that the self-directed digital learning should be supported by enabling structures to be efficient. Mean conceptual clarity contribution score of 3.49/5 also weakly shows the moderate positive effect with 54% rating it as 4 or 5. To obtain project and assignment support, 45% say there is some level of advantage (37% slightly, 8% strongly), and 40% say there is no influence or no academic use of EdTech.

Learning Outcomes — Likert Scale Analysis

Table 4 Presents the eight-item Likert scale findings on specific learning outcome dimensions. The data provides a finer detail on the effect of EdTech on learning. The best result is enhanced revision and review proficiency (avg 3.63) of which 59% respondents agreed with it (as EdTech is practically useful as a content repository to prepare exams and revise concepts). Better perception of challenging concepts come after at 3.46 with 48 percent agreeableness. The style match of self-paced learning scores 3.42 with 46 percent of the answer being in the affirmative. Particularly, the lowest average score was achieved by the statement of reduced classroom dependence (2.54) with the most significant proportion of 51% disagreeing or strongly disagreeing stating that the higher education students in Mumbai perceive

EdTech not as a replacement of classroom learning but as an addition. The improvement of time management and self-discipline received 3.13 with 32 percent of respondents disagreeing as is common to the self-regulation problem mostly present in online learning contexts.

EdTech vs. Traditional Classroom Learning

Table 5 presents comparative learning mode preferences and key challenges. An overwhelming 50 percent of the respondents favor blended learning to either of the two modes, 18 percent favor no meaningful distinction and 15 percent favor classroom-only learning. And the results of the preference survey allow highlighting the fact that only 6% prefer EdTech only, which is a very powerful conclusion in terms of emphasizing the complementary, rather than substitutive nature of digital learning. The most appreciated feature of EdTech is a variety of content formats (26%), self-paced learning (24%), and flexibility of time and place (22%) the combination of which constitutes 72 percent of the most valued aspect responses and continuously refers to the superiority of EdTech in personalisation and accessibility.

The greatest difficulties are the inability to have personal interaction with teachers (28%), and failure to have self-discipline (26%), which represent 54% of the most mentioned difficulties. These results have direct design implication of the EdTech platform, namely the necessity of live interactive capabilities, community discussion, AI-based coaching, and gamified engagement patterns. The structural barriers are high subscription bills (19%) and low internet connectivity (16%), especially among low income groups of students.

These results are supported by the Likert comparison in Table 6. Classroom learning scores the highest average of 4.03, and 76 percent agree to this statement, the most apparent indicator in the whole data set that the main weakness that EdTech has to address is social and relational, and not content-based.

Motivators, Barriers, and Future Outlook

The adoption of EdTech was mentioned as the most influential factor in the first place (61 respondents), and the competitive exam preparation (49), obtaining certificates (46) were ranked as the next most important stimuli, and finally, it was peer recommendations (43). This supports the pandemic as the structural force behind the adoption of EdTech in the higher education sector of India. The general rating of EdTech on personal learning was 3.28/5 with 44 percent rating EdTech at 4 or 5 (positive impact) and 30 percent rating EdTech at 1 or 2 (low impact) - a very diverse experience.

Table 5: EdTech vs. Classroom Learning Comparison (n = 100)

Question	Response	Frequency	Percentage (%)
Preferred learning mode	Blended learning (both)	50	50.0
	No significant difference	18	18.0
	Classroom only	15	15.0
	Depends on subject	11	11.0
	EdTech only	6	6.0
Most valued EdTech aspect	Variety of content formats	26	26.0
	Self-paced learning	24	24.0
	Flexibility of time&location	22	22.0
	Lower cost vs coaching	10	10.0
	Access to global instructors	10	10.0
Biggest challenge	Lack of personal interaction	28	28.0
	Self-discipline issues	26	26.0
	High subscription costs	19	19.0
	Poor internet connectivity	16	16.0
Overall quality vs classroom	Slightly better	27	27.0
	About the same	21	21.0
	Slightly worse	21	21.0
	Much worse	21	21.0
	Much better	10	10.0

Table 6: EdTech vs. Classroom — Likert Comparison (n = 100)

Statement	SA%	A%	N%	D%	SD%	Avg
Classroom better for peer interaction	30	46	22	1	1	4.03
EdTech better supplement than replacement	21	38	35	6	0	3.74
College should integrate more EdTech	11	39	37	11	2	3.46
EdTech better for self-study and revision	9	33	41	15	2	3.32
Would recommend EdTech to peers	6	23	48	20	3	3.09

Regarding the issue, of replacing college education, 68% say no or strongly no that EdTech can completely substitute conventional college (45% say no, 23 do strongly no), with only 10 percent saying yes. It is one of the conclusive findings of the research. To improve the platform, 31% would prefer improved live access to instructors, 26% request reduced prices or increased free content, and 18% demand employer/university accreditation of EdTech certificates - indicating both experiential and structural changes are necessary in order to add more value and higher usage of EdTech in higher education.

RESULT DISCUSSIONS, FINDINGS, MANAGERIAL IMPLICATIONS AND RECOMMENDATIONS

Key Findings

- **Finding 1 — Strong Awareness, Moderate Active Usage:** The number of respondents who know about EdTech platforms is 85% and only 49% of them actively use them. The most popular are College LMS (64%) and YouTube (60) indicating that people choose institutional or free content, rather than paid services.
- **Finding 2 — EdTech Excels at Engagement and Variety:** Content variety (avg 4.17), engagement (avg 4.13), and audiovisual quality (avg 4.10) are the highest-rated features, which proves the fact that the most powerful value proposition of EdTech is the rich and flexible delivery of content.
- **Finding 3 — Modest but Real Academic Improvement:** Fifty five percent of students claim better academic performance and forty five percent claim assistance in projects/assignments. The conceptual clarity average score is 3.49/5, which means that it has a moderate but significant positive effect on learning.
- **Finding 4 — Supplement, Not Substitute:** Half of them like blended learning, and 6 percent like EdTech only, and 51 percent do not agree that EdTech will decrease classroom reliance. The evidence is overwhelming that EdTech is a learning aid and not a substitute in the classroom.
- **Finding 5 — Interaction Deficit is the Core Challenge:** The greatest challenges are the absence of personal interaction (28%), and the problem with self-discipline (26%). The most important Likert average was classroom peer interaction (4.03) - determining social learning as the most severe gap of EdTech.
- **Finding 6 — COVID-19 as the Primary Adoption Driver:** A majority (61 percent) of respondents refer to the pandemic-induced transition to remote studies as the main motivational factor, and this shows that the implementation of EdTech in India has been more crisis-based than value-based.
- **Finding 7 — Strong Opposition to Full Replacement:** The most conclusive study findings are 68 percent of the respondents who disagree with or strongly disagree with the idea that EdTech can substitute traditional college education, and only 10 percent agreed.

DISCUSSION

The results of the given study create a clear and subtle image of the role of EdTech in the higher education market of Mumbai. EdTech platforms are abundant and welcome as an additional learning resource - especially due to their content variety, content revision, and exam preparation capabilities - but are not yet ready to replace the classroom as the main educational experience of the vast majority of higher education students. This puts EdTech in a facilitating position: it adds to the learning experience and supplements it, but does not overhaul it.

The average academic performance change (55% reporting the change) and average learning outcome Likert scores are in line with the evidence of worldwide research on self-directed online learning, which always demonstrates that the results are dependent on the motivation, self-regulation, and support structures. The low score on reduced classroom reliance (avg 2.54) and the extremely high preference of blended learning (50) is an indicator that Mumbai higher education students have internalised a productive model of EdTech use - that of a strategic and supplementary, but not wholesale, substitutive model.

Interaction deficit finding is also a significant one and directly indicates the relatedness need of SDT. Asynchronous, content-delivery-based EdTech platforms are not suitable to address the needs of real-time interaction, collaborative problem-solving, and social aspect of learning of the students. This is the most critical design and product issue of EdTech companies that want to engage more and enhance the outcome of learning.

The origin story of COVID-19 adoption (61%) poses a significant strategic issue: is EdTech usage to be maintained or reduced after campuses have re-opened? The average impact rating (avg 3.28) and the low-impact segment (30 percent) indicate that a more convincing, differentiated value proposition will be needed than an emergency-driven need to retain in the post-pandemic period.

Managerial Implications

For EdTech Companies: These results also dominate to show that EdTech firms need to focus more on live and interactive capabilities such as live doubt-solving sessions, peer-study groups, AI-assisted tutors, and community forums to rectify the interaction deficit the most-cited weakness of the platform. The high desire to use free platforms (56% free only users) and 26 percent indicated, making the largest percentage of improvements, to affordability, show that freemium models which provide strong free platform with premium interactive features will more effectively appeal in the Mumbai higher education market than subscription-intensive models. Institutional partnerships with the colleges of Mumbai University to incorporate EdTech tools into the formal curriculum should also be pursued by companies, exploiting the 50% preference of blended learning.

For Educational Institutions and Mumbai University: The results are highly suggestive of formalization of blended learning models in the institutions of higher learning in Mumbai. Instead of leaving EdTech adoption to the initiative of individual students, colleges ought to implement systematically curated EdTech content in course design, through the use of platforms as textbooks in digital form, as flipped classroom tools, as revision repositories, etc. Digital pedagogy and LMS management faculty development programmes are to be prioritised as College LMS is already adopted by majority (64) and it is the most direct institutional point of contact with EdTech integration.

For Policymakers and Regulatory Bodies: The 18% of the respondents who mention the non-recognition of EdTech certificates by employers/universities as the most important area of improvement cite a major structural issue within the EdTech value chain. The policy makers ought to strive to have a national system of identifying and credit-map-certified EdTech courses - a course in the direction of NEP 2020, but not yet implemented on scale. Also, so that equitable EdTech access is possible, it is crucial to invest in the stable internet infrastructure in under-served parts of Mumbai (Eastern Suburbs and Navi Mumbai/Thane have worse connectivity quality).

Recommendations

- The first differentiation strategy to be employed by EdTech companies is the infrastructural development of live interaction as a solution to the most often-heard claim of absence of interaction, which involves live classes, AI tutoring assistants, peer forums, and real-time Q&A.
- The pricing structures, which are heavy on subscriptions, should be replaced with a strong freemium model, especially to 56 percent of students who only use free platforms today - to transform free users to active and paying customers by revealing value.
- Colleges of Mumbai and the University of Mumbai would need to formalise the policies of blended learning, which would force the use of EdTech tools during the flipped classroom session, pre-lecture preparation, and post-lecture revision as a part of an official course delivery.
- It is expected that EdTech companies can localise to Marathi and Hindi and invest in widespread offline downloads, as well as optimise platforms to perform on low-bandwidth settings to respond to the connectivity and accessibility barriers found by 28% of the respondents.
- The governmental organisations must develop a credit transfer system, allowing EdTech certifications issued by certified services, which will encourage students to invest in digital education based on skills with a clear academic and career advantage.

CONCLUSION

This paper has analysed the perceptions and learning outcome experience of 100 higher education students in Mumbai with regard to EdTech platforms - an issue of increasing and increasing interest as India enters the post-pandemic digital environment. The results are that there is mindfulness, activity and generally positive attitude of the student population around EdTech, but they are firmly rooted in the importance of classroom learning and they are fully cognizant of the drawbacks of online learning that is entirely digital.

The attributes of the EdTech platforms that are most appreciated include the content diversity, visual interaction, and the flexibility of self-paced learning, which these models clearly exceed the textbooks and traditional teaching. Their effect on academic performance is averagely real and 55 percent of the respondents indicated that they improved their grades with 3.49/5 on conceptual clarity. The lack of interaction, difficulty with self-discipline, affordability issue, and barriers to connectivity are, however, substantive limitations to EdTech adoption depth and inclusivity.

The fact that 50% of students would like to have blended learning, only 6 percent would prefer EdTech only, and that 68 percent would not agree that EdTech can substitute college is clear: EdTech in the context of higher education in Mumbai is and should be presented as the potent complement and not its replacement. In the case of EdTech

businesses, it is not a constraint, but a commercial opportunity - the blended learning model is a huge, untapped market where well-formulated, affordable, and interactive online technologies can bring a transformative value to the formal education process. To institutions and policymakers, it is the need to formalize, structure and give equal support to this integration in scale.

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