Digital Technology Teaching and Learning Strategies:
An Impact Study of Higher Education Institutes (HEIs) in West Bengal

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Abstract

The arrival of Covid-19 has paralyzed the entire movement of the world around. The Pandemic influence has posed numerous challenges to Higher education around the globe. Educational Institutes are stagnated with teaching-learning gaps. The Higher Educational Institutes are grappling with changing context in educational system, where traditional instructional mode has become less effective during this crisis. The Covid-19 has brought the closure of total cessation of business, education and other activities. The lives have stranded, business handcuffed and education systems frozen. Cohen & Kupferschmidt, (2020)have indicated that the rise of closure of schools is increasing and the educational systems has been affected sector largely. According to UNESCO report 2020 indicates that there is an alarming situation around the globe regarding education. It reports that there are 1,215,881,292 affected learners, which is nearly 70 % of total enrolled learners and around 162 country-wide closures of educational institutes. It has really shaken the global educational institutes. Jain, (2020)has indicated that the tiny adventure of a few individuals with Covid-19, and has brought massive disruptions in Indian educational system. The background study has helped the researcher to identify considerable gaps in literature which in other justify the rationale for carrying out a research work on the topic under study. Due to obvious reasons, existing literature largely focuses on different aspects of ICT tools and technqiues. Using stratified random sampling technique, researcher has selected mixed Higher Educational Institutes (Male and female) for the present study. In this exercise, Researcher has prepared the list of Private colleges on the basis of the information available from the portal administered by Department of Higher Education, Government of West Bengal (www.wbhed.gov.in) Accordingly, a list of 80 HEIs has been prepared, administered and data was collected. Based on the predetermined sample size, we have received responses from 40 Higher Educational Institutes (HEIs) comprising of 162 respondents, which signifies a response rate of 64.08%. We have obtained a satisfactory value of reliability using Cronbach's Alpha (0.920) which signifies the overall strength of 55 items of the research construct. These 55 variables are drawn from ongoing research works and conclusions and these would be validated through current research objectives namely: to examine the overall influence of technology-enabled teaching and learning aspects, having contextual analysis with Correlation coefficients®, further studying the aspects converging into factors with factor reduction technique and finally formation of clusters to understand the close association of teachers in each cluster based their characteristics. The current research data was computed with the help of SPSS and drawn conclusions about the outcome of the current research namely: context analysis strategies, content development strategies, Technology-skill match, Technology Big five strategies, Teaching learning factors and cluster of two groups indicating High Technology Oriented Faculties and Moderate Teaching Learning oriented. Thus the current research outcomes have indicated that there is a sharp rise of online Teaching Learning platforms and we could predict the future of our educational systems have to be online based and directed to digital learning. The limitation of the study was the minimization of data and the respondents.

Key words: Teaching-Learning, Online platforms, Big Five strategies, Content, context, Information and Communication Technology (ICT), Curriculum Design, Student Coaching

I.   Introduction

The Covid-19 has posed numerous challenges to Higher education around the globe. Educational Institutes are stagnated with teaching-learning gaps. The Higher Educational Institutes are grappling with changing context in educational system, where traditional instructional mode has become less effective during this crisis. The Covid-19 has impaled the traditional medium of teaching-learning paradigm. This has mutilated the learning of students. Marshall, & Wolanskyj-Spinner, (2020) have indicated in their research that the closure of educational institutes has widen the gap in teaching-learning and having no access to Study materials, teaching inputs and the absence of evaluative methods. These realities have impacted the educational system and this led to explore alternatives to meet the demands of parents, teachers and students. This has given rise to the technology-enabled platforms to bring the teaching-learning fraternity and use technology-based teaching-learning paradigm. Thus, current research paper discusses about the influence of Covid-19 on Faculties of Higher educational institutes in West Bengal and posed to introspect the road ahead to engage purposefully to meet the demands of Students and prepare them for their careers.

II. Background

The Covid-19 has brought the closure of total cessation of business, education and other activities. The lives have stranded, business handcuffed and education systems frozen. Cohen & Kupferschmidt, (2020) have indicated that the rise of closure of schools is increasing and the educational systems has been affected sector largely. According to UNESCO report 2020 indicates that there is an alarming situation around the globe regarding education. It reports that there are 1,215,881,292 affected learners, which is nearly 70 % of total enrolled learners and around 162 country-wide closures of educational institutes. It has really shaken the global educational institutes. Jain (2020) has indicated that the tiny adventure of a few individuals with Covid-19, and has brought massive disruptions in Indian educational system. He further argued that educational system in India is being nailed to closure and leading to have a multiple layers of teaching-learning gaps. It has been observed that the pandemic Covid-19 influence has affected the performance of the students (Sintema, 2020). Burgess & Sievertsen, (2020) have voiced that Covid-19 has affected the learning environment as well as the key assessment period of leaners with promotion. Crawford, Joseph, et al. (2020) has gave a new insight that the Pandemic covid-19 has affected the university and colleges who are not using online for their learning and teaching purposes. Sahu (2020) has enumerated that the outbreak of Covid-19 has impacted on education, emotional and mental framework of students and the academic faculties. These studies have revealed that there is a sharp decline of teaching learning in education sector. Ozili, (2020) has provided a crucial view of Covid-19 that Covid-19 is leading to structural weakness in economics, infrastructure and services like education and access to health systems. It calls for an alternative model to enhance education and revive educational practices among the faculties. Educational institutes are inviting faculties to be creative and innovative in curriculum transaction exercises.

Thus, the above problems have posed a number of questions to policy makers, educationists and civil societies to tackle the situation during covid-19 period. In the context of educational institutes, it invites all of us to strategize new methodologies, curriculum design and outcome based education models. The current research aimed at studying various ICT tools and techniques used for enhancing teaching and learning instructional purposes. This is also to address how Higher educational Institutes (HEIs) in West Bengal are using the digital platform to empower both faculties and students to meet the challenges of imparting quality education. The research background has paved a way to comprehend the technology enabled teaching-learning of HEIs and contextualise the same in the light of HEIs in West Bengal. The application of technology-enabled teaching and learning in online class room environment needs training of faculties and creating interest of students to explore further the content taught.

III.　Methodology

The background study has helped the researcher to identify considerable gaps in literature which in other justify the rationale for carrying out a research work on the topic under study. Due to obvious reasons, existing literature largely focuses on different aspects of ICT tools and technqiues. The scare research on alternative model of instruction and learning tools and techniques have led the researcher to explore further. Furthermore, there is paucity of literature on technology enabled teaching learning paradigm in Higher Educational Institutes in the generic context, and particularly in the perspective of faculties-oriented learning aids and curriculum transition.

3.1.Research Objectives

In the light of the insights drawn from background of the study coupled with the theoretical understanding of technology enabled teaching-learning paradigm and its influence, the Current Research has the following objectives to examine how faculties in Higher Educational Institutes (HEIs) in West Bengal are trained to use technology enabled teaching and learning to empower students and help them to achieve their goals.

The Research Objectives are: (**1**) To examine the relationship between context-contend analysis of situation in HEIs during covid-19 impact. (**2**) To study the overall influence and nature of relationships among identified aspects used in technology enabled teaching learning paradigm. (**4**) To extract the different dimensions (Factors) of technology enabled teaching learning of HEIs. (5) To form the cluster associations based on their close proximity and the areas of operational orientation in technology-enabled teaching and learning.

3.2.Sample Design

Sampling and data collection are two important elements in research. Using stratified random sampling technique, researcher has selected mixed private colleges (Male and female) for the present study. In this exercise, Researcher has prepared the list of Private colleges on the basis of the information available from the portal administered by Department of Higher Education, Government of West Bengal (www.wbhed.gov.in) Accordingly, a list of 80 HEIs has been prepared, administered and data was collected. We have received the responses from 40 colleges with representation of 162 faculties (out of 250) around West Bengal. With a view to address the identified research objectives, a two-pronged research approach involving a questionnaire survey coupled 55 aspects and qualitative interviews with the Principles and Directors of select HEIs for collecting further information through ZOOM video conferencing, has been conceived. The data was verified, computed, analysed and interpreted.

IV. Discussion and Interpretation of findings

4.1.Introduction

Based on the predetermined sample size, we have received responses from 40 Higher Educational Institutes (HEIs) comprising of 162 respondents, which signifies a response rate of 64.08%. We have obtained a satisfactory value of reliability using Cronbach's Alpha (0.920) which signifies the overall strength of 55 items of the research construct. These 55 variables are drawn from ongoing research works and conclusions.

4.2.Context Analysis strategies

Table 4.A. Context Analysis Statistics			
Context Variables	N	Mean	Std. Deviation
Student Mindset	162	4.40	.873
Learning Gap	162	4.23	.690
Student Coaching	162	4.12	.935
Syllabus Gap	162	4.10	.710
Knowledge Gap	162	4.05	.876

The current research has shed more light on this issue of impact of pandemic influence on the educational in institutes in west Bengal. The objective 1 of current research is to examine the context in which the student learning is placed.

The Covid-19 has paralyzed the active participation of students in Higher Educational Institutes. The context analysis of closure of HEIs has given rise to a number of student related issues. The mean values of context analysis of issues concerning students is tabled in 4.A. The researcher has ranked in order the problems of students in terms of their learning during the pandemic closure of HEIs. The student mindset towards learning is ranked on the top. The issue of student mindset towards Higher Education has created a vacuum in their learning and undecisive committed to continue the active learning process. Current Research drives a conclusion from the responses that the Mindset of Students which scores the mean value of 4.40, is the top most issue to be dealt while facilities go online teaching. The faculties are finding difficult to motivate the students to become mindful in their learning. Since the data reveals that the students are more prone towards engaging in social media, they diverted their attention and interest from their learning. In the second place, the Learning Gap is found to be high as there is a variation in learning among the peer groups. The learning analysis of Students indicates the gap existing in the way students perform while the online tests are conducted.

4.3. Content Development strategies

Table 4.B. Content Development Statistics			
Content Variables	N	Mean	Std. Deviation
Curriculum design	162	4.12	.873
Curriculum organization	162	3.83	1.041
Syllabus Coverage	162	3.83	1.025
Syllabus enhancement tools	162	3.79	.968
Curriculum Planning	162	3.71	.937
Valid N (listwise).	162		

The learning analysis has paved a way to develop content strategies to cope with learning gaps. Teaching Faculties of HEIs are using online Curriculum design which scores the mean value of 4.12 for their instructional purposes. The curriculum design helps the faculties to bridge the learning gap and encourages students to learn more during the pandemic closure of HEIs.

4.4. Technology-Skill match Strategies

The table 4.C. gives an overview of Faculties in HEIs are more technology driven during pandemic closure of educational system. The present mode of learning is halted. The

Table 4.C. Technology-Skill Match Statistics			
Technology enabled variables	N	Mean	Std. Deviation
ICT dependency	162	4.16	.826
ICT application	162	3.98	.984
ICT adaptation	162	3.91	.955
ICT skills	162	3.91	1.018
ICT familiarity	162	3.91	1.002
Valid N (listwise) 162			

alternative way out is to use online platforms for teaching-learning. The mean value of the table 4.C ranks ICT dependency (Mean 4.16) and ICT application (Mean 3.98) as top ICT practicing elements by faculties in HEIs. It has been observed that there is a growing techno savvy mindset of faculty members and they are trying to use digital platforms for instructional purposes. The mean values in the table 4.C indicates that Faculties are getting acquainted with technology adaptation in teaching-learning paradigm.

4.5. The Technology "Big Five" Strategies

Table 4. D: The 'Big Five' Strategically Significant Aspects of Technology based Teaching and Learning of HEIs	Number of statistically significant relationships with Technology enabled strategies
ICT application	40
Online Team-learning	39
Curriculum Planning	38
Online FDPs	37
Online Quiz	37

The objective 2 is to study the Nature of relationship between the different identified aspects used in technology enabled teaching learning paradigm of HEIs in West Bengal.

Faculties in HEIs in Bengal are using the identified aspects that are having significant influence on the teaching-learning of faculty members. This objective 2 shows how the technology enabled aspects are interrelated to influence the context of Faculty teaching and learning. To establish the nature of relationship among the aspects, researcher has used the Pearson's correlation to determine the relationship. These aspects are having strong the significant values of correlation coefficient (r). In the context of current research, one aspect of Technology enabled teaching-learning is being statically correlated with other 55 variables that are used by faculties in HEIs. The relationship of One aspect (Variable) is to be strategically significant in the context of Technology enabled learning and teaching in HEIs, If it has statistically significant relationship ($r>0.6$) with a greater number of aspects in HEIs paradigm. The overarching aspect of ICT application is having statistically significant correlation with 40 aspects of Technology-enabled teaching and learning. Faculties of HEIs have manoeuvred ICT application into their teaching and learning. ICT application has become central to faculties to be familiar with and try to use its tools and technqiues to instruct students online. The second aspect is Online Team-learning which connects the faculties as a team to learn and disseminate the information, lesson input and insights to the students effectively. Team-learning has become important in sharing resources and ideas of teaching creatively.

4.6.The Technology Factors Strategies

The objective 3 is to extract the different dimensions (Factors) of Technology-enabled teaching and learning aspects comprising of 55 aspects. This is to extract factors by using factor reduction along with 55 aspects. Results of factor analysis reveal that the 55 aspects converged into 7 factors which have been considered as dimensions of Technology-enabled teaching and learning factors. It can be observed that the values of Cronbach's alpha of all the technology-enabled teaching learning dimensions are greater than 0.60. We have obtained very high value for the first dimension (0.928), also high values up to sixth dimensions also signify higher values (greater than 0.8). This shows the strength of the Factor scores.

S.No	SAO Dimension	Number of aspects related	Construct Reliability
Table 4.E. Technology-enabled Teaching Learning Dimensions		
1	Curriculum Technology	9	0.928
2	Team-Learning Orientation	7	0.880
3	Online Assessment Tools	6	0.892
4	Competency Development	5	0.891
5	Curriculum Transaction	5	0.860
6	Teaching Impact	3	0.817
7	Collaborative Learning	4	0.650

The first factor accounts for 38.5 % of variance explained and comprises 9 aspects with the . On the basis of the aspects that comprise the factor, the factor has been named *Curriculum Technology factor* comprises of 9 aspects having construct reliability 0.928. The *Curriculum technology* factor is related to internal aspects of Google Meet, ZOOM, CISCO, NEYON, OPENSIS. The faculties have used these digital online class room platforms for the instructional purposes. These Digital class rooms have given space for creativity to display content and enable faculties to deliver online lectures and class discussions. The Second factor is named as *Team-Learning Orientation* and comprises of 7 aspects namely: *Team-Communication, Team-resources, Team-learning* and etc. HEIs have oriented them to do. It has been observed that the covid-19 has made impacted on Faculties to share their ideas, learnings and teaching resources on digital platforms and share their class information on technology mode of communication. It has become easier to share and communicate in organizing classes and class notes. The their factor is *Online Assessment Tools* having six aspects namely: *Edmodo, Kahoot, TalentLMS, ClassMaker, Bigbluebutton, and Teacher Ease.*

The faculties in HEIs are using online Assessment Tools to examine the familiarity with content taught online and the performance of students. These assessment tools are used to monitor students and assign various online mode of assignments, quizzes and activities. The fourth and fifth factors are named as *Competency Development and Curriculum Transaction.* The *Competency Development* factor is associated with Cognitive skills, Creative Skills and Interpersonal Skills. These aspects are to enable faculties to give attention while they are using online platforms for their learning purposes. It has enabled them to evaluate how each faculty is using one's skills. On the other hand, the *Teaching Impact factor* is related to focus on the development of Students, while faculties go online for instruction. It has been observed that the faculties are making more efforts to coach and mentor students by attending to them.

4.7. Cluster Membership Strategies

In addressing the fourth objective of this research work, NGOs have been grouped based on commonalities with the help of cluster analysis. Researcher has carried out hierarchical clustering for faculties in HEIs followed by K-Means clustering to form clusters. As part of hierarchical clustering researcher has examined the dendrograms with respect to faculties in HEIs. From the dendrogram, two for faculties in HEIs could be identified.

Subsequently, K-Mean clustering is chosen to recognize cluster membership. The number of clusters in each of the clusters has been obtained from the results of K-Means clustering and these have been exhibited in table 4.F. The first cluster is named as *High Technology Orientation and it has the share of 26 % of the* Faculties in HEIs. In this cluster, the Faculties in HEIs adequately focus

4. F. Cluster formation of faculties in HEIs			
Number of Cases: Cluster formation of faculties in HEIs		Cluster Naming	
Cluster	1	43.000	High Technology Orientation
	2	119.000	Moderate Technology Orientation
Valid		162.000	
Missing		.000	

on the teaching competencies developed through technology-enabled teaching and learning. Higher emphasis has been observed in Faculties of HEIs who use curriculum technology, skill-building, assessment technology tools, development of specific coaching and mentoring and the faculties are becoming techno savvy in learning ICT tools and techniques to engage students digitally with more online creativity. The second cluster is named as *Moderate Technology Orientation and it has the share of 74% of the faculties in HEIs.* A significant number of Faculties in HEIs fall under this cluster. The current research has emphasised on some specific Technology-enabled teaching learning aspects that are practiced by Faculties. Faculties in this cluster largely get acquittanced with medium level of learning from online digital platforms and birdbrained with technology-based education model. Though the Higher Educational Institutes are providing online training for their faculties, the faculties are found to be moderate in using online platform effectively for the instructional purpose. The cluster gives a hope to empower faculties and help them to move to the cluster one with in-faculty training and technical support.

V. Conclusion

We are reaching at the end of the research. A unique contribution of current research is to add the strategic flavour to use the technology-enabled teaching and learning of faculties in HEIs. The research findings have revealed that the cluster closeness and association among the faculties in HEIs has resulted in growth of using digital platforms for teaching learning. Faculties could use online facilities to assess the students through various online mode of exercises like quiz, assignments, online answers and etc. Another unique contribution is that Faculties in HEIs have devised an online Student-friendly multiple options based test to develop their cognitive skills. This is my firm believe that teaching technology has changed the face of faculties. The limitation of the study was the minimization of the respondents.

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