From Brick to Click Classrooms: The Paradigm Shift

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Abstract: Necessity has always been the mother of invention and more so in the face of adversity. The COVID-19 pandemic ushered in a paradigm shift from 'Brick to Click classrooms'. While other sectors went digital in a phased manner, educationists the world over forged ahead, with the digital landscape making its debut on the academic horizon almost instantaneously. This called for equipping teachers with technological resourcefulness to fit in to the avatar that their new professional role demanded. The present study describes an endeavor undertaken by a B.Ed. college in Mumbai to launch a 'Tech Fluent Teachers' course for its student teachers, wherein, they were introduced to a range of digital tools, with an opportunity for hands-on experience. Thereafter, they used these resources to enhance the quality of the online lessons delivered by them during their internship programme at their Practice-teaching school. The paper evaluates the stakeholders' perceptions relating to 4 dimensions, namely, Learning Quotient, Participation Quotient, Satisfaction Quotient and Competency Quotient. Results revealed that there was a significant difference in the perceptions of school students and student teachers about digital learning tools. This indicates the immense worth of digital resources in scripting the success story of online learning.

Introduction

Schools across the globe witnessed a dynamic shift from the traditional face to face mode of instruction to its online equivalent with the advent of the unprecedented COVID-19 pandemic which confronted the world. It seemed like overnight, that books and classrooms were temporarily phased out by computers, tablets and i-pads with Zoom, Google Meets, Cisco WebEx, Microsoft Teams and Google Classrooms becoming the order of the day. Educators came to be honoured with the title of 'frontline warriors' only because of how efficiently they adapted to the virtual transition and rose to meet the challenges of propagating learning through a plethora of digital platforms and resources (Kalita, 2020). Taking on their new role on the techno-driven landscape, it became inevitable for teachers to hone technological resourcefulness if they had to cater to students who were digital natives and not digital immigrants like themselves.

Building digital competencies in teachers has always been the need of the hour as, overcoming their fallacies about using technology in teaching is the main mind block to grapple with (Fraillon et al., 2019). The underlying reason for this could be that teachers who have been in the profession for a reasonable number of years have grown used to their comfort zones as they have had less exposure to technology and hence can be rightfully classified as digital immigrants in our technocratic world of today. On the other hand, student-teachers who stand on the threshold of joining the teaching fraternity are far more adept at using technology to transact the teaching-learning process as; they are digital natives who have been exposed to digital resources sufficiently during the process of their own education (Prensky, 2001, Konig et al., 2020). Thus, empowering student teachers with a wealth of knowledge and expertise in the use of digital tools of learning would ensure that they become proficient in their career as teachers and develop competencies in transacting online instruction (Jäger-Biela et al., 2020).

Prior research studies have highlighted that there exists a gap in the teacher education curriculum with respect to the practical applications of ICT in classroom instruction (Fernández-Cruz et al., 2016).Other studies have indicated that though student teachers are thoroughly trained in communication skills, there is still a stark deficit in their ability to create digital content (Cabrera, et al., 2019).

This research paper provides a bird's eye-view of how technological competencies can be developed in student teachers so that they can enhance the digital skills of students they encounter in schools, contributing to the much needed changed mindsets on the educational landscape. This will not only ensure that education survives the pandemic but more importantly, takes on newer dimensions in a developing nation like India.

I. OBJECTIVES

The objectives of the study were as follows:

- ➢ To design and launch the 'Tech Fluent Teachers' (TFT) Course to enrich the existing B.Ed. curriculum.
- ➢ To provide student teachers with an opportunity to apply the knowledge and expertise gained therein in their online lessons during the Internship programme.
- ➢ To study the difference if any between the perceptions of school students and student teachers regarding the 4 effectiveness quotients of digital learning tools.
- ➢ To determine the worth of the TFT Course as a means of empowering student teachers in online teaching competencies.

II. HYPOTHESIS

The following null hypothesis was formulated for the study:
- ➢ There is no significant difference in the perceptions of school students and student teachers regarding the 4 effectiveness quotients of digital learning tools.

III. RESEARCH METHODOLOGY

The study was conducted over a 5 week period during the internship of Semester 4 of the S.Y.B.Ed. student teachers of a B.Ed. college affiliated to the University of Mumbai. The teacher trainees first attended the Tech Fluent Teachers (TFT) Certificate Course launched by the college to empower them to hone technological skills and know-how in the use of web-related applications and resources. The course was conducted in 3 phases comprising of 5 sessions each. Each session had a theoretical component of 1 hour duration and a practical component of an hour's duration. Each session was accompanied by an assignment, submission of which was mandatory. Thereafter, these student teachers were instructed to use the online resources that they had been introduced to, for teaching-learning and evaluation in the 10 lessons delivered by them via Google Meet during their internship programme.

The TFT course comprised of the following digital learning tools:
- ➢ H5P
- ➢ Classtools.net(Fakebook, Vortex, Telescopic Topic, Z to A Quiz Generator)
- ➢ MindMeister
- ➢ Wordwall
- ➢ Dotstorming
- ➢ ThingLink
- ➢ StoryWeaver
- ➢ Mentimeter
- ➢ Padlet
- ➢ Jamboard
- ➢ Kahoot
- ➢ Testmoz

The research design employed was descriptive.

4.1 Population and Sample

The sample comprised of 650 students of the Secondary section of an English medium private aided S.S.C. school in Mumbai and 8 student teachers from an English medium, private-aided teacher training college affiliated to the University of Mumbai, selected by the purposive sampling technique.

4.2 Data and Sources of Data

The Digital Learning Perception Scale was administered to the sample on completion of the 5 week internship. It was a 3 point Likert Scale comprising of 4 dimensions, namely, Learning quotient (LQ), Participation Quotient (PQ), Satisfaction Quotient (SQ) and Competency Quotient (CQ) with 5 items pertaining to each dimension.

4.3 Theoretical framework

The operational definitions of the key terms included in this study have been given below:

1. **Tech Fluent Teachers Course:** A 30 hour credit-based certificate course comprising of 3 phases of 5 sessions each with theoretical inputs, hands-on-experience and assignments related to a gamut of innovative technological apps and online learning resources which can be used by student-teachers to enhance the online teaching-learning and evaluation process.
2. **Digital Learning Tools:** Web-based online applications and resources that can be used for curricular transaction and pedagogical purposes to foster curiosity in students making them active participants in their learning process and helping them attain mastery learning.
3. **Student teachers:** Students enrolled for the Choice Based Credit System (CBCS) 2 year full time Bachelor of Education Degree conducted by the University of Mumbai for those interested in pursuing teaching as a career.
4. **Practice-teaching School**: A school in which student teachers are placed for the period of their internship to gain hands-on-experience of all the curricular and co-curricular activities normally organised by a school.
5. **Learning Quotient:** A quantifiable measure of a student's learning potential or the ease with which a student can learn successfully in the online mode with the help of digital learning tools.

6. **Participation Quotient:** A quantifiable measure of the extent to which a student takes part and interacts in the online teaching-learning transactions comfortably and effectively.
7. **Satisfaction Quotient:** A quantifiable measure of the fulfilment of a student's learning needs through the virtual mode of instruction leading to a feeling of self-confidence and gratification.
8. **Competency Quotient:** A quantifiable measure of the different skills, abilities and aptitudes a student/student teacher develops in the cognitive, affective and psychomotor domains through the online learning mode of instruction.

4.4 Statistical Analysis

The scores were tabulated and then analyzed using descriptive and inferential statistics.

➢ **Descriptive analysis** included the magnitude of the variables included in the study to show the perception of student teachers and school students towards the use of digital learning tools in enhancing online instruction.

➢ **Inferential analysis** included the Student's t-test to determine any likely difference in the perceptions of student teachers and school students towards the use of digital learning tools in enhancing online instruction. The difference was considered highly significant when the P-value was less than 0.001 and 0.0001.

V. RESULTS AND DISCUSSION

5.1 Results of Descriptive Statistics of the Study Variables

Table 1 shows the magnitude of the variables of the study.

Table–1: Magnitude of the Variables of the Study

Variable	Group	Mean	Percent Mean	Magnitude
Learning Quotient (LQ)	School students	8.36	83.6	High
	Student teachers	9.75	97.5	High
Participation Quotient (PQ)	School students	7.97	79.7	Substantial
	Student teachers	9.5	95	High
Satisfaction Quotient (SQ)	School students	8.39	83.9	High
	Student teachers	9.63	96.3	High
Competency Quotient (CQ)	School students	7.53	75.3	Substantial
	Student teachers	9.63	96.3	High

From Table-1 it can be concluded that the Percentage Mean of Learning Quotient and Satisfaction Quotient was found to be high in school students as well as student teachers indicating the effectiveness of digital learning tools with regards to both these dimensions. The Percentage Mean of the other 2 dimensions of digital learning tools was found to be substantial in school students and high in student teachers. The higher value in the latter category indicates their perception of these 2 dimensions of the digital learning tools used to enhance the effectiveness of online learning in the context of the intended objectives. However, the relatively lower Mean percentage value of these 2 dimensions for school students implies that in reality digital tools do not rank high in these 2 areas with regards to learners. The obstacle to active participation of all the learners in a classroom could be due to several reasons which could range from connectivity issues, access to computers and laptops in their home environments to lack on hands-on experience and training in how to use these online applications so as to make participation wholehearted and comfortable for them. With regards to competency development, a period of 5 weeks is probably too short and insufficient to contribute to making learners adept at technological skills or at ushering in a change of attitude to the concept of online learning. Nevertheless, the fact that deserves a mention is that the Mean percentage of all 4 dimensions of digital learning tools in both groups of stakeholders is sufficiently high to indicate their worth in enhancing the effectiveness of the virtual learning platform in education.

Figure 1 provides a graphical representation of both the stakeholders' perceptions of the 4 dimensions of digital learning tools.
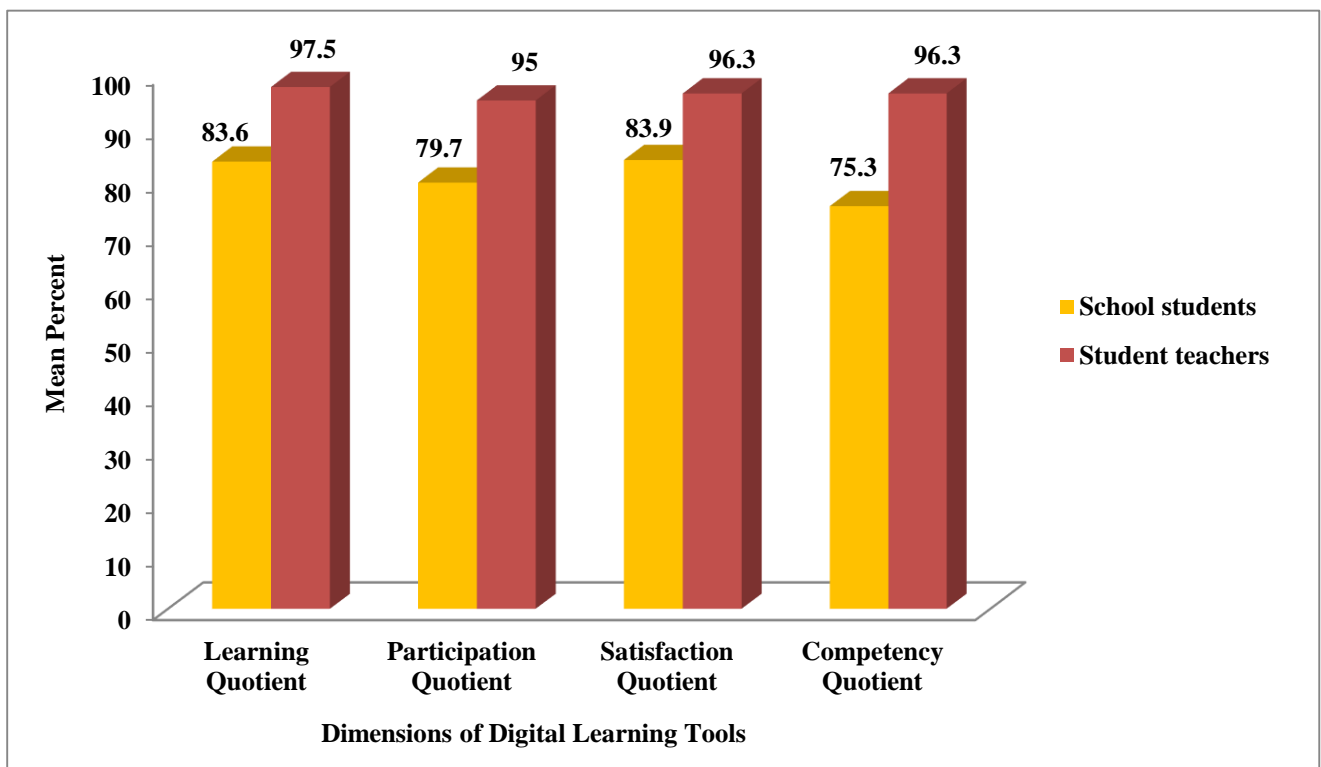

Figure 1: A Comparative Summary of Both the Stakeholders' Perceptions of the 4 Dimensions of Digital Learning Tools

5.2 Results of Inferential Statistics of Study Variables

Testing the Null Hypothesis:

The null hypothesis states that there is no significant difference in school students' and student teachers' perceptions of the 4 selected dimensions of digital learning tools.

Table 2 shows the relevant statistics of the study variables for school students and student teachers.

Table – 2: Relevant Statistics of School students' and Student teachers' Perceptions of the 4 Different Quotients of Digital Learning Tools

Variable	Group	N	Mean	S.D	t-ratio	P-Value	Level of Significance
Learning Quotient	School students	650	8.36	1.69	7.87	P <.0001	0.0001 Highly significant
	Student teachers	8	9.75	0.46			
Participation Quotient	School students	650	7.97	1.68	5.56	P <0.000534	0.001 Highly significant
	Student teachers	8	9.5	0.76			
Satisfaction Quotient	School students	650	8.39	1.57	4.57	P <0.001815	0.001 Highly significant
	Student teachers	8	9.63	0.74			
Competency Quotient	School students	650	7.53	1.76	4.7	P <0.003310	0.003 Significant
	Student teachers	8	9.63	1.06			

The tabulated values for 't' are as follows (Garett, 1985):

For df = 648,   t at 0.01 level = 3.71   t at 0.05 level = 2.45

Similarly, for df = 6,   t at 0.01 level = 2.59   t at 0.05 level = 1.96

Interpretation: The obtained t-ratios for perceptions of the 4 different dimensions of digital learning tools revealed that for all dimensions 't' is greater than 3.71. The P-value is < 0.001 for the Participation Quotient and Satisfaction Quotient; and is < 0.003 and 0.0001 for the Competency Quotient and Learning Quotient respectively. The result is thus significant at the 0.01 level for all 4 dimensions. The null hypothesis is therefore, rejected, indicating that there is a significant difference in the perceptions of school students and student teachers about the effectiveness of digital learning tools. It was interesting to note that the mean scores of Participation Quotient and Competency Quotient of student teachers were higher as compared to those of school students. A comparison of the mean scores for the other 2 dimensions indicates that there was only a minimal difference between perceptions of student teachers and school students with regards to Learning Quotient and Satisfaction Quotient of digital learning tools.

5.3 Discussion: An analysis of the results pertaining to the null hypothesis indicates that there is a significant difference in the perceptions of school students and student teachers about the effectiveness of digital learning tools.

In terms of the Learning Quotient, results indicate that both school students and student teachers are unanimous in their perception that digital learning tools enhance learning as they make abstract concepts concrete and reinforce memory. Findings further highlight the fact that the intended objectives of student teachers in using digital tools to foster mastery learning are meeting their desired purpose as is implied by the comparably high mean value for this dimension in school students. The highlight of these tools in impacting learning outcomes has been attributed to their distinct advantages of drill and practice, self-paced learning and corrective feedback (Moreno and Mayer, 2007). Jewitt et al. (2011) proposed that the use of digital resources in the classroom increases active learning, hence reinforcing concepts which could otherwise easily be forgotten. The efficiency of these tools in promoting literacy (reading, writing and spelling) and numeracy skills cannot be denied (Laio et al., 2007; Higgins et al., 2012).

The difference in perception of the Participation Quotient of digital learning tools though significant, reveals that the Mean value of student teachers for this dimension is considerably higher than that of school students. This could be attributed to the possibility that the student teachers made a sincere effort to engage the students wholeheartedly in the activities organized through the digital learning platform. They encouraged and motivated students to participate and tried to use a gamut of online applications to make the lessons interesting, enjoyable and interactive. The lower Mean value of school students for this dimension indicates that they felt a little apprehensive and diffident in participating in online games, quizzes and activities. This could arise from social stigma (being first time users of the digital platform), connectivity issues (which caused some of them to get logged out unintentionally), no access to PCs and laptops in their home environments (due to financial constraints), some online apps not being supported by mobile phones and inadequate orientation and stepwise instruction on how to proceed with the online activity in question due to time constraints in a lesson of 30 minutes duration. Other researchers too have reported lower participation rates of students in online teaching, stemming from distraction, lack of face time and disconnection from social interaction (Dhami, 2020). It needs to be realized that digital learning tools are a means of education and not ends in themselves. Educators must come up with innovative ways to encourage and sustain student participation when online games and activities are used to transact the curriculum to help them serve their true objective.

The reasonably high perception of both groups in terms of Satisfaction Quotient strongly supports the thinking that the use of digital learning tools in curriculum transaction is a welcome move for both the student and teacher fraternity. It is perceived as a direct means of invigorating the lessons with creative ideas, stimulating critical thinking to replace rote learning and compartmentalized understanding and instilling confidence in students that mastery learning has been achieved. It also implies that student teachers are more enthusiastic to plan their classroom lessons by choosing from a wide array of online resources which makes teaching a satisfying and rewarding experience. Digital learning tools provide teachers with the added advantage of securing and holding students' attention easily and effectively as compared to the traditional method of 'chalk and talk'. Students too eagerly look forward to attending classes where lessons have an element of interest and are loaded with excitement by way of digital games, online quizzing applications and other tools to make learning a fun filled experience. Shea et al. (2003) reported among the vital elements that contribute to students' satisfaction, the most significant ones are an enhanced and appealing learning environment, distinct rules of engagement and motivation from the teacher. Marsh and Roche (1997) explained student perceptions of satisfaction of online learning environments in terms of teacher enthusiasm, rapport created, classroom interaction, coverage of the topic, and active participation.

With regards to the Competency Quotient of digital learning tools, there was a significant difference in the perceptions of students and student teachers. The latter category ranked higher in the development of competencies relating to the Cognitive, Psychomotor and Affective Domains of learning. The teacher trainees honed their technological skills in creating different games and activities for their lessons using different tools they had been introduced to as part of the 'Tech Fluent Teachers' Course. In exploring creative ideas to enhance the quality of their modules, they developed ingenuity and critical thinking ability. They also overcame their fears, inhibitions and misconceptions relating to the use of the virtual platform in teaching due to consistent use of the same for five weeks. The TFT Course also served as an impetus to their aptitude and attitude so as to cope effectively with the use of digital learning tools. The comparatively lower Competency Quotient in the school students is corroborated by the understanding that a five week period is too short for competencies to develop in individuals unless they are directly involved and engaged in hands-on experience of using these digital tools on an on-going basis. Integrating these tools in the teaching-learning process would be more likely to inculcate thinking, confidence and an attitudinal change in students, thus throwing light on the

immense worth that lies in the use of this pedagogy not only as a resilient approach during the COVID-19 pandemic but even beyond. On the basis of research evidence, Salmon (2000) has also suggested that students develop competencies such as online socialization, information exchange, knowledge construction, reflection and building connections in online learning environments, provided activities are systematically planned, executed following guidelines which students have been oriented to and carried on consistently so that they become familiar with virtual learning portals. Rogers (1995) has proposed a Diffusion model, prescribing stages for the extent to which diffusion of innovative online learning technologies will lead to competency development, ranging from awareness, interest, evaluation, trial and actual adoption.

The higher Mean values of all the 4 quotients, namely, LQ, PQ, SQ and CQ in the student teachers as compared to those of the student sample indicate the worth of the TFT course as a means of empowering student teachers in online instruction. It had not only taught them the art of ensuring mastery learning in students but also trained them in efficiently using digital learning tools to secure and sustain maximum student participation. More importantly, it had instilled in them the confidence that they could use the online learning platform to help instruction become meaningful, enjoyable, engaging and purposeful. The most salient highlight of the TFT course was that it had helped in achieving the ideals of Domain based learning in student teachers, by developing in them competencies of head, hand and heart.

VI. CONCLUSION

The success of any new pedagogy calls for adequate training of those who are to implement its use. When it comes to the use of digital learning tools, student teachers become the pivotal point of attention; as reinforcement of their repertoire of skills would determine the technological evolution of the generations they will impact in the future. All that is required is an iron will, a changed mindset and a positive attitude to raise the bar of the quality of teaching. This can be done by breathing innovation, novelty and creativity into every classroom lesson through a plethora of online applications and software waiting to be explored. It's now time to move beyond the 'pandemic' and shift one's gaze onto the 'panoramic' view of the digital landscape in education.

On the basis of the findings of the present study the following recommendations can be put forth to enhance the teacher education curriculum and the quality of online instruction imparted to the school students.

1. Digital tools of learning have invaluable worth in the context of making classroom instruction an enjoyable, interactive and meaningful experience and also contribute to mastery learning. Hence, it is imperative that their use in instruction is continued even post-pandemic.

2. Student teachers being digital natives, coming from a tech-savvy generation, already have the much needed exposure to the use of technology in teaching. Introduction of courses to strengthen their technological know-how and skills during their teacher education programme would contribute significantly to reinforcing their confidence and competence in using digital learning tools effectively in their career as teachers. These student teachers would have a ripple effect in strengthening the technological skills of the learners they encounter in schools, bringing about a paradigm shift from 'brick to click' classrooms on the educational horizon.

3. Ushering in the use of digital learning tools to transact the curriculum would serve a more important purpose of evolving a pedagogy which is logically sound and based on the dogma, "I see and I forget, I listen and I remember, I do and I understand'. It would help to make learning an engaging and rewarding experience where education meets its true purpose of making learners active participants and not passive recipients in their learning process.

4. Encouraging the use of digital tools of learning in classroom instruction would help student teachers and teachers to explore their creativity in unearthing newer ideas to infuse interest in learning. This in turn would serve as a path changer in catapulting traditional classroom teaching beyond the boundaries of textbooks and classrooms to a landscape of exciting activities which transcend the barriers of rote learning. Minds would be transformed into power houses, learning into discovery and education into a thriller in the life of every student.

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