

Inroad of Digital Technology in Education: Age of Digital Classroom

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journals.sagepub.com/home/hef**Mayengbam Nandakishwor Singh¹** 

Abstract

Technology has become an integral part of human life, and it has made inroads in the sphere of education. Digital technology is largely reshaping the nature of learning in classroom. Digital classroom is one clear manifestation of this emerging trend. There is a burgeoning academic culture of digital classroom today. It is increasingly incomprehensible for the larger academic community to quench their thirst for knowledge without computer technology. The blending of traditional classroom and digital classroom becomes almost imminent. But it is also equally important to understand the inherent merits and demerits of digital classroom. Use of computer technology can enhance the quality of education, but technology alone cannot be sufficient. The basic challenges lie in entrenching the proper use of benefits provided by digital technology. This article seeks to examine the pros and cons of digital classroom along with the major challenges it poses. The methodology applied for this study is explanatory approach. A theoretical-based research, coupled with practical experiences, through critical analysis of existing literatures on digital classroom is carried out.

Keywords

Technology, community, knowledge, efficiency, learning

Coming of Age of Digital Classroom and Revolutionizing Learning

There is constant advancement of technology in all fields, and technology is meant to serve human requirements better. As the effects of technology are felt in

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all spheres, the inevitable role of technology in the classroom cannot be simply dispensed with. Trendsetting revolutions in the field of technology and the inroad of technology in classroom are bound to be by and large in sync. Technology is a part of everyday life, and it is mainly for higher efficiency and better productivity. In this sense, use of technology in classroom is naturally inevitable. The integration of digital technology in education is to transform teaching and learning into an enriching process for both teachers and students. As digital technology progresses by leaps and bounds, its effects permeate in many spheres. Education is definitely one pivotal domain, where digital technology is already incorporated successfully. Imagining modern education system without the infusion of digital technology is simply not possible. Designing a modern classroom without digital technology is simply incomplete. The emergence of digital classroom in the recent times is an absolute path-breaker. It is precisely because the advancement of technology and education are not dichotomous. In fact, education and technology are destined to be intertwined.

In this digital era, the term 'digital' is conceived in multiple ways. Digital generally refers to the system relating to the use of computer technology. *Oxford Advanced Learner's Dictionary* defines it as using a system of sending and receiving information as a series of numbers as opposed to analogue. Today, being digital is becoming an overarching trend in various domains, and it has already occupied its space in the field of education. As a matter of fact, classrooms are fast transforming into digital classrooms. Digital classroom can be understood as the smart classroom where computer technology is integrated during the course of teaching and learning. In other words, digital classroom is the process of teaching and learning by integrating the applications of information and communication technology (ICT) (Abu & Abu, 2016, p. 56). The broad purpose of inducting digital classroom is to improve the quality of learning and teaching. It is to transform learning and teaching in tune with the changing demands of the new age of technology. In other words, technology in education is to improve the quality of education in terms of efficiency and optimal output (Stosic, 2015, p. 111). In this sense, digital classroom is a path to streamline the classroom to be more productive and constructive. More importantly, students in the twenty-first century need to be taught different technical skills. It is argued that digital skill forms a fundamental requisite to thrive in life (Firmin & Genesi, 2013, p. 1604). It becomes necessary to infuse the use of digital technology in classroom. Besides, teachers are required to update their skills in digital technology with the changing needs of the time.

As a matter of fact, there is sketchy explanation about the exact historical evolution of digital classroom. Literature that chronicles the evolution of digital classroom is scanty. It is also because the trend of digital classroom is of recent origin and it is fast evolving. According to Al-Bataineh and Brooks (2003, pp. 474–478), the history of computer technology use in classroom can be broadly classified into three phases. The first phase was during the 1980s, in which computers in classroom were found to be mostly unused as teachers lacked sufficient technical knowledge to apply in the class. There were no adequate computers for the students in the class or labs. The second phase was during the

early to mid-1990s, and there developed the networked computer laboratories capable of providing instruction to the entire classes. Students had the access to large volumes of information in computer laboratories. The third or the contemporary phase started during the late 1990s, in which the data-driven virtual learning provided by the Internet was introduced. Personal computers connected to the Internet become available in the classes in this phase. With the emergence of computer tablet, the ultimate route steers towards having a textless and bookless classroom. It must be noted that the pace of digital technology in education has accelerated since the late 1990s. It is because new technologies have been marvellously generated since then, and educational technology has been successfully making transformations. Thus, the fascination for digital classroom has already captured the imagination of academic community for various reasons.

Today, digital technology is widely utilized not only in higher education, but also in lower schools. With the increasing access to digital technology, online learning is fast becoming a norm. As Ng (2015, p. 12) rightly points out that online learning is extensively enabled with digital technology in education, the recent trend is that larger sections of students are able to avail courses of their choice free of costs through massive open online courses. It is a known fact that the demand for quality education and supply are found to be mismatched in several areas. Digital technology in classroom comes as handy in imparting education to the wider sphere. With the help of digital technology, education has become accessible to larger sections in society. Without doubt, the market forces also speed up the pace of digital classroom over the years.

Transformation of Traditional Classrooms into Digital Classroom

With the emergence of digital classroom, the germane question is about the nature of it. How would a digital classroom look like? What would be the quintessential feature of a smart classroom? Digital classroom has arrived with its own peculiar features. In plain words, digital classroom would be a classroom of wireless keyboards, wireless mouse, wireless laptops, wireless projector connections, wireless video projectors and wireless laptops. The environment in a digital classroom would be clouded by computer devices. There would have slides, projectors, CD, DVD and video players, TV, iPods, computers, laptops, Internet and so on. Moreover, there would have digital boards, digital screen, digital sound system and digital pen. These tools are meant for the augmentation of education in classroom. Digital classroom would be different from the usual traditional classroom in several aspects. In the traditional classroom, teaching and learning are mostly based on the simple use of notebooks, textbooks, photos and so on. The approach is essentially confined to the model of chalk and talk. The classroom lecture and the amount of knowledge flowing to the students are usually linear.

It is a common knowledge that teachers and instructors are seen as the main source of knowledge in the traditional classroom. But in digital classroom, the

sources of knowledge are multifarious, and the flow of information and knowledge is wider. A traditional classroom is usually held within the four walls with limited persons. At times, students may be passive learners in a traditional classroom. But in a digital classroom, the space and size are bound to be increased. Digital classroom may capacitate the flow of knowledge outside the four walls of a classroom. Students can be enabled to become active participants. Students in far-off places may be provided the opportunity to attend class in a digitalized classroom. In a digital classroom, unlike a traditional classroom, academic community will have the ample scope of interacting with their counterparts in various countries. In the process, they can hugely enrich their knowledge system with the global exposures. Such interaction can promote the diversity of knowledge in the academic community. The modern trend of webinar, video conferencing, video chat, and online conferencing has proven this. But it must be taken into cognizance that digital classroom is not meant to desecrate traditional classroom. Digital classroom must be seen as an essential upgradation of the traditional classroom. Digital classroom is not the antithesis of traditional classroom.

While digital technology has revolutionized the traditional model of classroom, digital classroom carries some barriers for teachers, students and administration. It is true that some teachers find the use of digital technology so useful in the age of information technology. But not all teachers are enthusiastic about the advent of digital classroom. Many teachers are found to be uncomfortable with the computer technology. They are ill equipped in operating digital technology in classroom. Many teachers need extra efforts to update themselves with new technologies required in digital classroom. Today, most of the educational institutions spend large amounts in buying computer hardware and software. But the same level of expenditure is seldom reserved for the training of operating those devices in an organized manner. It is a requisite that institutions must invest enough finance for basic training. Besides, computer equipment once acquired need proper maintenance and servicing. Therefore, huge money is required for the maintenance and trainings of digital tools (Ranasinghe & Leisher, 2009, p. 1957).

Today, there is a knitted connection between educational institutions and corporate houses. Educational institutions provide skilled students who can serve as the employees of the companies. At the same time, industries may provide new technology for improving the quality of education in various ways. Corporate industries may fund educational institutions. So, there is a transparent symbiosis between the education sector and the corporate sector. Introduction of digital classroom is in tune with this interdependency in many ways. In the longer run, digital classroom may serve as the platform for the students to be familiar with the use of technology from the very young age. In a digital classroom, students would be sufficiently exposed to the basic nitty-gritty of the digital technology. They would be familiarized with the modern sources of information. As certain skills of information technology are necessary in today's job markets, exposure to new digital technology in classroom would equip them better. Regular exposure to the use of digital technology in the classroom can expand the prospects of job opportunities.

It is quite visible that the level of reach of digital classroom in different countries is not even. It is largely because of the huge economic and technological

disparities among the nations. For instance, the reach of digital technology in classroom in a developed country like Singapore is naturally far ahead of many poor African countries. In the advanced developed countries, digital classroom has already become the norm. In developed countries, use of digital technology in classroom is surging apace. In a developing country like India, digital technology is available more in centrally funded educational institutions. But in several state-run educational institutions, there are rampant fund crunch. As the result, the pace of adopting digital technology in classroom is relatively slower. Interestingly, the trend of integrating digital technology into classroom is catching up fast in the private educational institutions.

The inroad of digital technology in education may be deemed as a boon for elevating education system. But the unequal distribution of digital technology in education may also beget unwanted outcomes. For the populous and impoverished third world countries, introduction of digital technology in education may mark a sharpening division between urban and rural education sectors. Widening of the level of education in rural and urban areas can have certain repercussions. For instance, it has the potential for engendering social and economic unrest in the long run. As a matter of fact, the advent of digital classroom may broaden the scale of imparting most up-to-date education. The uneven reach of digital classroom may produce uneven level of modern education. So, the wave of digital classroom does not come with full guaranteed benefits for all.

Positive Impacts of Digital Classroom and Inevitable Trend

There are some noticeable advantages in a digital classroom. Digital classroom would definitely widen the scope of interaction between the teacher and students. With technology, students will be enabled to be responsive more in the class. This would thereby transform the classroom into a more interactive classroom. It is rightly argued that technology-based learning activities could not only enhance communication and collaboration between teachers and students, but also enhance active learning (Gallou & Abraham, 2018, p. 174). In a digital classroom, persons with physical disability, such as vision impairment and hearing problems, may be provided special attention (Chen, 2011, p. 1). Students having lower grasping power or average IQ would be greatly supported with digital technology. It would also ensure that the academic community become more and more up-to-date in their academic activities. Instead of sticking to the traditional method of lecturing in the class, use of digital technology would enable teachers to demonstrate relevant documentaries, videos to the students in order to deepen their understanding. When the instructor applies variety of multimedia teaching devices, instead of solely relying on books and notes, students may find the class interesting (Firmin & Genesi, 2013, p. 1606). This also makes the class livelier and realistic to the students. The more innovative and creative ways of teaching is possible in the ICT-integrated classrooms.

In addition, digital technology in classroom can make a flipped classroom feasible. Generally, flipped classroom means a teaching technique where students

are encouraged to prepare for the lessons beforehand and teachers engage in clarifying students' doubts and questions in the classroom. Flipped classroom in which teacher can invert the conventional method of teaching can create a dynamic classroom. Furthermore, learning activities can be more diversified in a digital classroom. It is argued that learning activities in a digital classroom can be more individualized for each student with the availability of technology (Tiene & Luft, 2001, pp. 30–31). Along with it, digital classroom can incorporate the traditional method of teaching in the form of blended classroom so as to transform the classroom more productive. Familiarizing with sufficient computer skills through digital classroom will infuse both teachers and students to be self-confident. This would definitely empower them in life. In fact, use of technology produces wealth of information and knowledge, which is a blessing for the academic community.

Digital classroom opens up the scope for wider and transparent sharing of knowledge and information among the academic community—not least teachers and students. With the burgeoning trend of globalization, there is enormous expansion of knowledge. It is a way beyond teachers' capacity to gather them all and transfer to the students. So, in a digital classroom, the process of education can be two ways, in which both teachers and students can contribute. Digital classroom can enable both teacher and student communities to share data. Students may come prepared with the topics in class, which would improve the learning process better. Through digital tools, teachers can save their time in the classroom. Teachers can repeat explaining certain concepts clearly through all the relevant documents. It can help the teachers in executing their lesson planning meticulously during the class. In a digital class, teachers can have virtual notebooks, which can be useful for revising and updating course contents quickly for new classes. From a practical point of view, imparting of education may not necessarily be confined to classrooms. In the age of digital classroom, students can be enabled to attend to the lectures from the outside the classroom. In such a scenario, it becomes possible that students need not be always sitting in the classroom. This would be possible for both teacher and students to expand wide range of academic activities beyond classrooms.

We are living in an age in which everything is becoming more and more digitalized. In government offices, in financial circle, and banking sector, all data are digitalized. It becomes indispensable to equip the younger generation in computer technology. Digital classroom can help the citizens to become digital natives to face the changing trends. Moreover, it may be remotely argued that digital classroom may prove to be eco-friendly as it seeks to establish a paperless and penless classroom. And in today's age of cut-throat competition, students having exposure to computer technology are better prepared. Seeing this, for instance, some schools in Singapore have ICT, technology experiential studios, ICT-enabled library, and mathematical modelling studio (Schreiber, 2014, p. 17). Students coming from such environment would have extra advantages in the job market. Those who are not exposed to such technological environment are bound to be lagging behind in certain job sectors. One who is not adept with the use of basic educational technology is destined to lose out in many fronts.

Digital Classroom and Ingrained Disadvantages at the Fore

Certain observable negative impacts ingrained in a digital classroom cannot be overlooked. In a digital classroom, it is possible that students may develop a habit of neglecting class lectures. This is because they will be under the impression that lectures can be recorded in their computer apps, and they can listen whenever they wish to. In many cases, there are chances of students doctoring those recorded class lectures for their ulterior motives. The endless supply of information and data through information technology may not increase the human cognitive ability of students. Not all students are well equipped to absorb knowledge from the technology platform. In simple terms, self-learning is not a cup of tea for everybody. In a digital classroom, there is a possibility that students would use smart phones during class, which may sully the academic environment. It is because there is no guarantee that students will use them only for academic purpose. Students may be inclined towards the social networking sites and gaming, which may become the major points of distractions in the classroom. Students may become multitasker in digital classroom. While working on academic activities, checking of messages and texting to friends may divert their focus. Immense distracting factors are involved in digital classroom where learners are required to pay undivided attention. This may eventually retard the intellectual development of students at large. Students may be diverted from developing the patience for critical learning.

Overreliance on digital technology may slow down the learning process of both students and teachers. It is because there is easy access to all the information, and it may derail their thirst for the quest of true knowledge. Relying so much on the information available may deprive them of developing skills to critically filter them. Also, depending too much on computer may weaken the problem-solving abilities among the academic communities. This may further debilitate their efficiency in performing various tasks themselves. As the consequence, humans may slowly lose certain mathematical and cognitive skills that are essential for excellence in life. In fact, humans may become the slaves of the technology in the future. More importantly, students may be inclined towards the rote learning with the increasing reliance on computer in the classroom. For instance, use of power point presentation (PPT) while teaching has become a dominant trend today. It is normally believed that students can grasp better in the audio-visual presentation than in a monotonous lecture. But the counterpoint is that the level of concentration by students may get minimized in the class. Students may not have the capacity to concentrate both on the teachers and the slides on board simultaneously. In a digital classroom, overdependence on PPT may push students to give full attention on the screen rather than connecting with the teachers. Thus, students may be driven just to recollect facts and figures and regurgitate them in exams. Furthermore, students may be slowly detached from the culture of reading books for gathering knowledge.

New technology demands mastering of sufficient know-how on the part of the teachers and students. Inefficient use of computer technology may definitely

result in an undesirable academic environment in a digital classroom. There is a flip side of digital classroom for the teachers too. Inadequate facilities for digital classroom may hamper the teaching activities of the teachers. At the same time, ineffective use of computer technology in teaching may produce ineffective class. It is stated that the inadequacies of technology and the inability to use technology in classroom may cause frustration to the teachers (Kelly, 2015, p. 40). This may lower the performance and the self-esteem of the teachers. Besides, unqualified teachers may rely too much on digital tools in classroom. They may fail to disseminate knowledge to the students properly. Inept teachers may be over-dependent on digital devices just to manage the class. Such practice may degrade the purpose of using digital devices, which is to ameliorate classroom teaching. Digital tools can be a blessing in disguise for inefficient teachers to camouflage their handicaps. Those who have less passion for teaching profession may misuse digital technology to pass their time in class.

With the arrival of latest cutting edge technologies, the level of sophistication will also be accelerated. Both students and teachers would be required to invest valuable time and energy to master those newest technologies. The potential disruptions caused by the technological glitch in the classroom can be far reaching. In the cases where frequent technology glitches occur, the overall experiences would be so depressing. Much of the precious time would be consumed in trying to fix the problems. In the process, maintaining a sound classroom will become so taxing. Moreover, complete reliance on technology in classroom may destroy the sacred relation between teacher and student. Overdependence on technology in the classroom may compromise the value of teaching ethics and etiquette to students (Schreiber, 2014, p. 17). There is a beautiful culture of teachers lending a helping hand to the emotional and psychological needs of the students. However, with the influx of technology in the classroom, students' need for emotional support or psychological care may be left unattended.

Digital Classroom and Embedding Challenges Ahead

It is a fact that every technology can be both a boon and a bane. This applies equally to the digital technology in the classroom. It is beyond doubt that the trend of digital classroom has brought some challenges in the fore. As a matter of fact, setting up a full-fledged digital classroom is an expensive project, which requires sufficient funding and administrative assistances. Acquiring new tools, computers, digital devices and connection of regular power are very costly. In many cases, there is shortage of funding and support system in the education sector. It is true that not all educational institutions are financially sound. At the same time, there is also the possibility of the 'commercialization of digital classroom'. Private educational institutions with their insatiable quest for profit may trumpet tall promises about the smart classrooms. They may resort to all unfair means to grab the attention of parents and kids. Today, the talk of smart classroom has become

so fashionable. With the effects of colourful advertisement, large section of people is fascinated by the wave of 'smart-classroom'. The fashion of putting up huge advertisements and hoardings about digital classrooms in public places by the private educational institutions has become the phenomena. Their main purpose is to attract the students for the commercial reasons. In the name of education, rampant commercial exploitation can take place. But, there is no robust mechanism to check the surreptitious activities of the profit-driven private institutions. It is a challenge to diffuse awareness among the people not to fall into the trap of commercial campaigns. Both government and people together have a task to curb this menace.

There is a lack of vibrant policy regarding the implementation of digital classroom. Blind adoption of digital classroom can be disastrous in many ways. In other words, a mindless application of digital technology in the classroom without appropriate planning can produce devastating results. In many cases, teachers, students and administrators are not constantly oriented about the new digital technologies. As the result, often people tend to experiment with new digital technology in the class. Unintended mistakes occurred in the process can sabotage the whole purpose of digital classroom. Moreover, the misuse of digital classroom can be harmful not only teachers and students, but also for the society at large. Digital technology provides enough scope for unethical activities in the classroom. For instance, there are looming dangers of 'cyber bullying' through digital classroom. Unethical practices can be transpired in a digital classroom. Streamlining the productive use of digital technology in classroom is the challenge for all the stakeholders.

Induction of digital technology in classroom may bring disparity in the field of knowledge. A disparity of knowledge among the academic community within a country or in the global level can emerge. When there is unequal access to digital technology in classroom, the dividends cannot be shared equally. It is a plain fact that those who have exposure to digital technology in classroom may possess extra edge. Unequal access to digital technology in classroom can divide the level of quality education. Digital classroom is expensive and many educational institutions cannot afford to have it. There is no policy regarding the uniform implementation of digital classroom. Inside a country, enormous gap would be created, which will eventually derail the process of imparting quality education for all. In the global level, digital technology in classroom can widen the gap between developed and underdeveloped countries. Economic factor plays a big role when it comes to digital classroom. It is the developed countries that are the pioneers of digital classroom. With the advanced facilities for learning and teaching through digital classroom, developed countries are bound to lead in the research and innovations. They can perpetuate to monopolise information and technology. Difference in learning and teaching through digital technology has huge impacts in bringing all round developments. If education is the panacea for progress, it can also be true that the quality of education imparted can also produce different outcomes.

Concluding Remarks

It goes without saying that technology is created to provide better service to humans. Technology is the product of human endeavour, and technology also shapes the human perception in many ways. As humans seek constant progress in various fields, there is advancement in new innovations and technologies. Cutting-edge technologies are integrated into human life. So, it is almost impossible to leave the classrooms untouched by technology. Technology has already made its inroads into the education sector in a big way. It is the reason why the wave of digital technology is catching up fast today. It is an unequivocal fact that computer technology is enhancing new ways of learning and teaching. The purpose of integrating digital technology in the classroom is to alleviate the quality of education. Initiation of digital technology in classroom is to increase efficiency and optimal outcome. Digital technology in classroom is not about replacing the role of teachers, but it is about supporting the role of teachers. Digital technology in classroom is not to hamper students' learning process, but to widen their learning activities. What is called for is to make use of digital technology in the classroom in the most productive ways.

But use of digital technology in classroom has its own limits. The process of teaching and learning involves human touch. No matter how advanced and sophisticated a technology can get, it can never replace the human touch. Digital technology cannot substitute the human pedagogy entirely in classroom. Digital technology by itself cannot bring powerful impacts in classroom. There are several areas in which traditional class methods are more appropriate and productive. It is, however, not to deny the importance of digital technology in the classroom. It is also equally important to note that digital classroom can manufacture multiple adverse effects. Attempts must be to place judiciously the ill effects of digital classroom at bay. Nevertheless, whether the inroad of digital technology in the classrooms is fruitful or not in the long run would be largely contingent upon how prudently technology is made to serve in advancing educational horizons.

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