



## Effect of Technology use in Education

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**Abstract:** The current generation of learners has been very much influenced by technology. Instructors have the power to engage learners in the learning activity by using online resources, tools or apps at learners' level of interest. However, there has been the issue of clearly defining integration of technology in education. Technology integration in education is a process, it would be considered effective if learners are capable of choosing a tool which can help them to acquire, analyze, synthesize and present the information in a timely and professional manner. Nevertheless, technology is a means or a tool to achieve an end goal, technology is not the end in itself. This paper discusses the various tools and resources available for education, their advantages and disadvantages. How can we improve the technology integration? What are the options available? This paper discusses these issues and their possible solutions.

**Keywords:** Education, e-learning, educational tools, learning resources.

### 1. Introduction

Technology has become an indivisible part of our lives. It has transformed the way we work, think and play. Technology is a strong factor in driving social, economic, educational and political reforms (Jhurree, 2005). The integration of technology revolutionizes the learning and teaching processes in education. Technology integration in education is the use of technological tools in education for developing better learning abilities and problem-solving skills in students. However, the informed leadership and support of the administration, deans and faculty leaders are crucial to expand and sustain integration of technology in education (Strudler and Wetzel, 1999). Many studies have shown that the integration of technology in curriculum has enhanced the learning process and outcomes of the learners (Earle, 2002). Teachers, who use computers as problem solving tools, are more

constructive and students are more engaged in learning by using these tools and can become critics and creators instead of just consumers. Interactive multimedia and technology are more beneficial in project based learning. There are tons of techniques available by which technology can help in education. Technology integration in education is the necessity in today's digital society. In the present era, students must possess skills which are vital to be successful in an increasingly connected global world. These skills include social and personal responsibility, critical thinking, visualizing, decision making, planning, creativity, cross-cultural understanding, strong communication skills, presentation and interpersonal needs and knowing when and how to choose and use the technology and tools that are most suitable for the task. Integration of technology into curriculum renovates the learning and teaching processes (Knee, 1995). There are various tools



and resources available and are being used in education such as interactive whiteboards, 3D virtual environments, student response systems, class performance systems, mobile devices, project based activities like Cyber Hunt etc. Technology resources are specialized software, computers, communication systems and other equipment. This paper discusses the various tools and resources available for education, their advantages and disadvantages.

Technology integration essentially has to be seamless and routine and it must be effective and efficient. Many organizations are not able to integrate the technology in education properly and are struggling with the issue of integration (Keengwe, Onchwari, and Wachira, 2008). These issues mainly arise because of mobile, social and cloud platforms (Selwyn, 2011). How can we improve the technology integration? What are the options available? This paper discusses these issues and their possible solutions.

International Society for Technology in Education (ISTE) has developed ISTE standards for students, teachers, computer science educators, administrators and coaches. These standards are for evaluating the knowledge and skills which students need to learn effectively and the instructors need to teach, learn and work in the digital society and an increasingly connected global world. The paper also focuses on understanding these standards, their importance and the role of key players and the impact of successful integration of technology in education.

## 2. Technology Integration in Education

The incorporation of technology-based practices and resources into daily routines, management, work, teaching and learning in education may be defined as technology integration in education (Garrison, 2011). Technology-based practices comprise communication, collaboration, network-based transmission, remote access to instrumentation, Internet-based research, retrieval of data, and other approaches. Technology resources include network-based communication systems,

computers, specialized software and other tools and infrastructure.

## 3. Use of Technology in Teaching and Learning

The effective use of technology and technological tools such as media, networking etc. in teaching and learning is termed as educational technology integration. Electronic education technology which is also known as e-learning has now become an integral part of the society. Technology ushers in changing the fundamental structure that can lead to achieve significant improvements in productivity (Wang, 2005). It is expedient for both learning and teaching. In classrooms, technology infuses digital learning tools such as smart podium, hand held devices and computers. Technology expands course offerings and learning material's availability and supports learning relentlessly. It accelerates learning and improves student's engagement and motivation. It has influenced the teaching by introducing new models of affiliated teaching. These models connect teachers to their students, resources, professional content and systems (Moore, Dickson-Deane and Galyen, 2011). Technology has provided the opportunity to learn online. It has increased the productivity of education by efficiently utilizing the teacher's time and accelerating the learning rate and by decreasing the instructional material's cost. There are three most widespread technology driven models of learning are such as Virtual or online or managed learning, Full-time online schools and Blended learning.

## 4. Virtual or online or managed learning

Virtual (online or managed) learning environment is, a web-based platform, usually intended for multiple courses within educational institutes. The essential property of online learning is asynchronous learning that enhance learning effectiveness and cognitive presence (Garrison, 2003). It supports digital prospects of the courses and provides online learning opportunities and the exchange of information between the institute and the enrolled user. This type of platforms commonly offers content



management, curriculum planning and mapping, learner administration and engagement, and collaboration and communication. The principle components which are required for online learning or virtual learning platforms are as follows:

1. Student tracking
2. Online support for both teacher and student
3. Internet links to outside curriculum resources
4. Electronic communication (web publishing, e-mail, threaded discussions, chat etc.)
5. Curriculum mapping (breaking curriculum into sections that can be assigned and assessed)

Every user in this type of environment is assigned with a user ID. The teacher has additional rights than a student. A teacher can see what a student sees as well as he/she can modify or create contents and monitor students' activities. There are many commercial virtual learning software are available such as COSE, WebCT and Lotus LearningSpace etc.

##### **5. Full-time online schools**

Full-time online programs have grown at a very rapid pace in last decade (Cavanaugh, Barbour, Clark, 2009). Improvements in the use of technology in education has provided opportunities to the learners to get an academic degree without even going to college. Full-time online schools allow students to enroll in a course on full time basis without attending the classes in institute. There are online academic degree programs (sometimes non-degree certificates and high school diplomas also) conducted by these online institutes, with flexible class schedule which is the need of people who are working and want to pursue an academic degree (Watson, 2008). These degrees can be earned by just using a computer which is connected to the internet rather than going and attending the classes in college campus. These schools do not only provide the opportunity to learn but also provide number of services to the students such as career planning, student-to-

student interaction, test preparation and other services.

According to Distance Education Accrediting Commission (DEAC) report, 7.1 million students took admission in online degree program and a major portion of the students completed their online degree (DEAC, 2016). Although online education is new relatively, however the number of colleges, course offerings and competition are increasing day by day. Some of the employers have stated that they don't find any difference between degrees obtained in traditional ways and obtained fully online. There are hundreds of institutes which provide at least one online degree. However, the features which students value the most are flexibility, affordability, instructors and quality support. Some of the most famous online colleges are Arizona State University, Northern Arizona University, University of Central Florida Granite State College and State University of New York / OPEN SUNY etc.

##### **6. Blended learning**

Blended learning method integrates both online learning and face-to-face learning. In this type of learning, the way online and face-to-face learning is integrated in a course can vary from school to school and course to course (Means, Toyama, Murphy, Bakia and Jones, 2009). This type of learning strategy is usually employed to provide diverse learning modes and flexibility to the students so that they, who are working, can manage their work time which is often not possible in conventional full-time classroom instruction. Blended learning use the potential of online learning to enhance the educational productivity by providing flexibility, accelerated learning rate, reduced cost of learning materials and better utilization of instructor's time (Rovai and Jordan, 2004). Some of the popular institutes which use blended learning environment are Michigan virtual school, Walled lake consolidated school, Riverside virtual school etc.

##### **7. Technological Tools for Education**

There are numerous technological tools which are being used in education such as



cameras, interactive whiteboards, electronic media, document cameras, projectors and smart podiums etc. (Forehand, 2010, Reeves, 1998). These tools can be used for various purposes in education as follows:

1. Supporting task structures
2. Helping in processes and procedures
3. Easing the access to knowledge bases
4. Representing knowledge in multiple forms (e.g. audios, videos, text, images etc.)

### 8. Interactive Whiteboard

It is a large computer connected interactive display. The computer's desktop is projected using a projector on the board which is usually mounted to a floor stand or a wall. The user sends the command to the computer using a stylus, pen, finger or other device. Interactive whiteboards were intended to design and developed for office use only by Xerox Parc around 1990 (Türel, 2011). These boards use a resistive touch based board, infrared scan technology, an electromagnetic pen and device drivers (software) for the interaction between the board and the user (Bell, 2002). The majority of interactive whiteboards are based on one of the following interactive operation.

- a) An infrared scan (IR touch) interactive whiteboard
- b) A resistive touch-based interactive whiteboard
- c) An electromagnetic pen-based interactive whiteboard
- d) A portable ultrasonic, IR pen-based interactive whiteboard
- e) A Wiimote / IR-based interactive whiteboard
- f) A virtual whiteboard via an interactive projector

Interactive whiteboards are extremely helpful and can be used for numerous operations such as:

1. Capturing the notes written on the whiteboard and storing them to the connected computer.

2. Capturing and storing the notes written on whiteboard connected graphics tablet.
3. Controlling the connected computer from whiteboard by markup which annotates a presentation or program or by click and drag.
4. Running software such as web browsers from the connected computer
5. To translate cursive handwriting written on whiteboard using OCR software
6. Using audience response system for conducting quizzes, polling a classroom audience, capturing feedback onto the whiteboard.

The whiteboard allows students and teachers to collaborate and comment on it and the entire class can see and give feedback at the same time.

### 9. Student Response System(SRS)

An SRS is a remote control like device which enables the students to submit their votes, feedbacks and to answer questions when an instructor provoke the class. These systems are also referenced as audience response system or classroom response systems or personal response systems. It is a set of software and hardware which aids in various teaching activities (Edens, 2008). The basic working of the system is as follows:

- a) The instructor poses a question (let's say a poll) to the class.
- b) Each student solves the question and submits the answer using a transmitter (usually called "clicker")
- c) The SRS software collects the students' responses and produces the results to present on the screen.

The data (students' answers) sent by the students is stored on the connected computer which can be utilized later for analysis and grading. There are many types of questions which can be discussed using SRS such as questions on critical thinking, recall, application, conceptual understanding, student



perspective, confidence level, monitoring and classroom experiments etc. These systems have numerous application in different class activities such as taking attendance, contingent teaching, homework collection, assessment, discussion warm-up etc. (Hall, Collier, Thomas and Hilgers, 2005). Using SRS increases students' participation, interaction and attention in the class and enhances productivity of learning.

### 10. E-book Reader

It is a mobile electronic device which is designed to read, browse, shop and download e-books, magazines, newspapers and other digital media using internet or wireless networking. These devices are optimized for readability (in sunlight especially) and portability (Connell, Bayliss and Farmer 2012). These devices have storage to load hundreds of books. Some devices support various formats of the contents and also allow to load the contents from computer using a USB cable or by email (Herther, 2008). An e-book reader is very similar to a tablet but usually has longer battery life. These devices also support sharing by using which a person can share reading material with another person.

### 11. Document camera

Digital cameras capture real-time images and display them to a large audience. Digital cameras are also known as visualizers, digital overheads, visual presenters or docucams. These cameras, just like opaque projectors, magnify and project transparencies and the images of actual 3-D objects. Instructors can write or draw on a paper sheet and use this camera to present 2-D or 3-D objects to the class. Theoretically, document camera can be used to display all objects (Samuel and Michael, 1972). Document cameras can be divided into three groups such as smaller lightweight or portable, desktop model and ceiling visualizers.

### 12. Projector

Projector is, also known as image projector, an optical device. This device projects image (moving and still both) onto a projection screen or surface. The projection process differs

among different types of projectors. Most projectors create projection image by gleaming a light through a lens, some projectors use lasers to project image directly, however, retinal projectors directly project images on virtual retina display without using any external projection screen. Although, video projectors are more common nowadays and they use LEDs or lasers to project images.

### 13. Smart podium

Smart podium or Sympodium is an interactive computer monitor. It allows instructors to highlight or annotate parts of the page being projected by capturing cursor movement.

There are numerous of tools and gadgets (such as laptops, smart phones, tablets, digital pens etc.) available which are commonly being used in education and in our day to day life. Each tool has its own advantages and disadvantages. However, it's up to you how efficiently and effectively you can utilize the technology available to you. Educational technology advancements have changed the basics of teaching and learning process. Instructors are becoming more dependent on technology and using it to engage the students in learning, however just having the technology is not enough, there has to be quality content for technology to be effective.

### 14. Web Tools for Education

With the emergence of new technologies, web tools for learning are also growing at a very rapid pace. Innovative instructors and learners are commonly using these tools and resources for social learning, sharing and collaborating, organizing and planning. These web tools can prove to be very useful.

### 15. Social learning web tools

Instructors and learners can take advantage of these tools which use the social media power to connect in online sessions, share study materials, manage content and discuss problems and solutions. Some of the most popular social learning web tools are edmodo, grockit, edublogs, skype, wikispaces, pinterest,





schooling, quora, ning, openstudy and epals etc.

#### 16. Web tools for sharing and collaborating

In the past few years a number of tools have emerged for collaborating and sharing the documents and media. These web tools allow multiple users to work in a document in real-time, gather information on forms and launch online discussions and feedback. Now, you can work together from anywhere around the world. Most commonly used collaborating and sharing tools are google docs, google forms, wordpress, edublogs and wikispaces among others.

#### 17. Lesson planning tools

There are numbers of lesson planning web tools available on internet nowadays, with the help of these tools one can plan, design and organize great lessons and projects for students. Some of these tools are planboard, timetoast, teachers pay teachers, capzles, prezi, quizlet, masterconnect, youtube, ted-ed, creaza and mentor mob.

#### 18. Learning tools

These educational tools assist in making courses interesting, and more effective. There are thousands of online courses published by various universities and colleges through different websites. Some of the best instructors are providing free courses and material online, instructors can use it to create better lessons and students can utilize it to learn more than the classroom. Most popular names include khan academy, national programme on technology enhanced learning, coursera, open course ware, edx, MRuniversity, MIT opencourseware, ted-ed and edmodo etc.

#### 19. Organization and Planning tools

If you are collecting resources from multiple places, organization of these resources can be challenging. Fortunately, there are web tools available to get rid of this, these tools (such as evernote, dropbox, google drive etc.) allow to organize and move among different devices seamlessly.

#### 20. Other Useful Tools

There are plenty of other web tools available which can be used to stay connected, be organized, and build multimedia lessons. There are so many ways in which you can use these tools in education effectively. For example, with Diigo, you can treat web like a printed paper on which you can highlight, take notes or add sticky notes, Aviary can be used to edit images, audio and apply different effects and modify screen captures, SlideShare lets you upload documents, presentations and videos and share them with others. There are many more such tools available like jing, popplet, google earth, donorschoose, audioboo and livebinders etc.

Technology application in practice can be studied through key questions, measures and indicators for technology integration in education. There are numerous reasons to monitor the effectiveness of technology integration. Technology integration in education is in many ways similar to its integration in a business. Measures, performance indicators, or standards should be available to assess the effectiveness of the integration, however, it is possible that some of the significant effects may be challenging to measure. However, the most significant reason for assessing the effectiveness of integration is to understand the technology impact on institute or instructor or learner is dependent upon educational productivity. ISTE standards provide ideas, guidance and resources to assess the technology integration into education.

#### 21. ISTE standards

ISTE (stands for International Society for Technology in Education) has published a set of standards (also known as NETS or National Educational Technology Standards) for teachers and students for the goal of leveraging the technology use in education.

#### 22. ISTE standards for students

ISTE has published six performance indicators and standards for students. Each standard indicates the technological learning goal for the student which should be achieved



by the end of academic year. These standards are guidelines for the students to make them aware of the learning goal. ISTE standards for the students are as follows:

1. Creativity and Innovation: Using technology, students exhibit creative thinking and develop new products, processes or generate new ideas. While working individually or in group, they create original works, use simulations and models to explore and to find issues in complex systems and to identify forecasts possibilities and trends.
2. Collaboration and communication: Students employ a variety of technological tools to communicate, collaborate, solve problems and contribute to projects with other students, instructors and professionals and to develop global awareness and understanding of cultures and by engaging with other cultures.
3. Research and information fluency: They utilize digital tools to plan, organize, gather, evaluate, analyze, synthesize and use information from different sources and media to process reports and data results.
4. Critical thinking, decision making and problem solving: They apply critical thinking to solve problems, plan and conduct research, manage projects and make informed decisions utilizing digital resources and tools.
5. Digital citizenship: They demonstrate positive attitude toward technology use and understand technology related human, societal and cultural issues and practice ethical and legal behavior.
6. Technology concepts and operations: They exhibit sound understanding of technology concepts and operations and systems. They use current knowledge to learn new technology, troubleshoot and use applications and systems productively and effectively.

### 23. ISTE standards for teachers

The goal for ISTE standards for teachers

is to make the roadmaps for effective teaching model. These standards give the directions to the instructors to improve learning environment for students, engage students, enrich them professionally and provide positive models for the community, colleagues and students. There are five performance indicators and standards for instructors as follows:

1. Facilitate and inspire student creativity and learning: Instructors facilitate experiences and clarify students' conceptual understanding, planning and thinking, and support, promote, engage students in solving problems and exploring real-world in virtual and face-to-face environments.
2. Develop and design and digital age learning experiences and assessments: Instructors develop, design and evaluate assessments and learning experiences and incorporate resources and digital tools to maximize educational productivity. They develop or adapt relevant learning experiences, develop technological learning environments, personalize and customize learning activities and provide summative assessments and varied formative according to the technology and content standards.
3. Model digital age work and learning: Instructors demonstrate skills, knowledge and work processes of an innovative professional. They exhibit fluency in moving from current technologies to new technologies, collaborate using digital tools and resources, communicate ideas and relevant information, model and use emerging and current digital tools to locate, evaluate, analyze, and use information resources to support learning and research.
4. Promote and model digital citizenship and responsibility: Instructors model, advocate and teach safe, ethical and legal use of technology and digital resources, including respect for intellectual property, copyright and the proper documentation of sources. They model and promote responsible social interactions and digital etiquette related to technology and information use,



1. develop global awareness and cultural understanding, address the diverse needs of students.
2. Engage in leadership and professional growth: Instructors enhance their professional practice, exhibit leadership and model lifelong learning by demonstrating and promoting the effective use of technology and resources in their professional community and school.

#### 24. Conclusion

The current generation of learners has been very much influenced by technology. Instructors have the power to engage learners in the learning activity by using online resources, tools or apps at learners' level of interest. The key for instructors is to find those tools and resources and employ them into teaching. However, there has been the issue of clearly defining integration of technology in education. Technology integration in education is a process, it would be considered effective if learners are capable of choosing a tool which can help them to acquire, analyze, synthesize and present the information in a timely and professional manner. Nevertheless, technology is a means or a tool to achieve an end goal, technology is not the end in itself.

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