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Integration of Technology for the Development of 21st Century Skills in Teachers

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Abstract

In the 21st century, with the change in education system the role of teachers has not only changed but keep on changing from an instructor who pours the knowledge in the mind of learners, teachers have become a constructor, facilitator & creator of learning environment who guides and assist the learners in construction of own knowledge. This changed scenario of teaching and learning has necessitated the incorporation of 21st century skills in the teachers and their pedagogy deliberately with proper strategy. These skills facilitate psychosocial abilities, which may enable them to inculcate strong interpersonal skills, effective communication skill, self-awareness, critical thinking and problem-solving abilities for effective confrontation of conflicts and cope up with stressful situations and emotions. Technology can be a powerful tool for enhancing 21st-century skills in teacher. A teacher with digital literacy skills can help pupils develop scientific temper, critical thinking, and creativity to become lifelong learners and innovators. Together with learning for life and learning through life, they must respect lifelong learning. Teachers must get continuous training and retraining in order to fulfill their roles with greater significance and efficacy. This paper tries to explore that how technology can be used to foster the development of these skills.

Keywords: 21st century skills, technology, professional development, teachers

Introduction

The fundamental idea of digital competency of professionals in the knowledge sector characterizes the educational landscape of the twenty-first century. As a result, education and training must be prioritized. Teachers play a critical role in delivering education and creating learning experiences; thus, they must get ongoing training and development. Digital competency is exciting, but it also necessitates that educators put in extra effort to stay up to date on the latest developments in technology-based skills. As stated by Prensky, (2001) education is one of the largest problems facing by digital world because our educators are digital immigrants whereas our students are digital natives; this digital generation gap has created a digital divide between teachers and learners. The teachers are struggling to teach a generation that has an increased exposure to technology, which has altered their thinking style, way of working along with the way of interaction and responding to digital devices. Therefore, to meet the specific learning needs of this generation, teachers need to get the knowledge and skills necessary to incorporate technology into their everyday lives as well as the classroom. The position of a teacher has evolved and will continue to evolve from that of an instructor to that of a constructor, facilitator, and designer of learning environments. In addition, instructors must use critical and creative thinking to analyze the material that is accessible as well as their own experiences. To accomplish this, they also need to be digitally competent which assist them to learn about, communicate with, understand one another, recognize & handle emotions, influence their societal values, improve interpersonal relationships and working in collaboration with others. It is also believed to promote deeper understanding, and the development of digital age competencies like knowledge management, critical thinking, problem-solving, and enhanced communication skills.

21st Century Skills

"21st-century skills" is a term often used to refer to a set of abilities, competencies, and knowledge areas that are thought to be necessary for success in the contemporary world. These abilities are believed to be particularly important in today's rapidly changing, information-driven, and technology-oriented society. 21st Century Skills has been defined by The Glossary of Education as "The term 21st century skills refer to a broad set of knowledge, skills, work habits, and character traits that are believed— by educators, school reformers, college professors, employers, and others—to be critically important to success in today's world." 21st Century Skills- A handbook published by Central Board of Secondary Education (2020) outlines that "the 21st Century Skills are the skills that are required by an individual for his/her holistic development so that he/she can contribute to the progress and development of his society/nation and world."

The European Reference Framework in 2006 had identified eight key competences i.e. (i) Communication in the mother tongue; (ii) Communication in foreign languages; (iii) Mathematical competence and basic competences in science and technology; (iv) Digital competence; (v) Learning to learn; (vi) Social and civic competences; (vii) Sense of initiative and entrepreneurship; and (viii) Cultural awareness and expression. Trilling and Fadel (2009) proposed three groups of 21st century skills in their book *21st Century Skills: Learning for Life in Our Time*, as (i) Learning and innovation skills, (ii) information, media, and technology skills, and (ii) life and career skills. Assessment and Teaching of 21st-century skills (ATC21S) grouped 21st-century skills in 4 groups (i) way of thinking, (ii) way of working, (iii) tools for working, and (iv) living in the world.

While there is some variation in how these skills are grouped and defined, they generally encompass the following key areas:

- **Critical Thinking and Problem Solving-** the ability to analyze data, assess arguments, and come to well-reasoned conclusions. Critical thinkers can identify problems, formulate solutions, and adapt to changing circumstances.
- **Creativity and Innovation-** the ability to solve problems creatively, come up with fresh concepts & original ideas, use fresh perspectives having cutting-edge methods and creative problem-solving techniques. Creative individuals are often capable of thinking "outside the box" and coming up with innovative solutions.
- **Communication-** Effective communication skills include the ability to express ideas clearly, listen actively, and convey messages through various media. This includes digital communication tools in addition to written and verbal communication.
- **Collaboration and Teamwork-** The skill to work effectively and to collaborate with people in varied teams in an efficient manner people in a variety of groups. Collaborative individuals can share responsibilities, leverage the strengths of team members, and work toward common goals.
- **Information Literacy-** The ability to locate, evaluate, and use information from various sources, including digital resources. Information literate individuals can discern credible information from misinformation and apply it appropriately.
- **Digital Literacy and Technology Skills-** Competence in using digital tools, software, and technology devices. This includes proficiency in navigating digital platforms, using software applications, and understanding digital security and privacy.
- **Adaptability and Flexibility-** The capacity to become accustomed to new circumstances, surroundings technologies.
- This skill is crucial in a rapidly changing world where individuals may need to learn new skills and adapt to evolving circumstances.

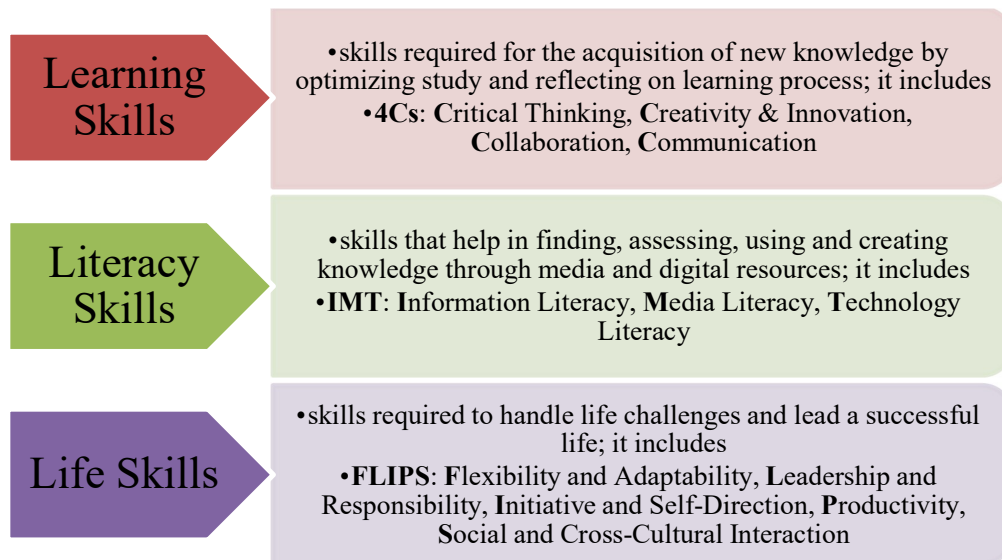
- **Cultural and Global Awareness-** An understanding and appreciation of diverse cultures, global perspectives, and the ability to work effectively in a multicultural environment. This skill is essential in an interconnected world.
- **Emotional Intelligence-** The ability to identify, comprehend, and manage one's own emotions as well as those of others. Emotional intelligence is valuable for building positive relationships and effective interpersonal interactions.
- **Resilience and Grit-** The perseverance and resilience to overcome challenges and setbacks. Individuals with grit are determined and able to persist in the face of adversity.
- **Media Literacy-** The ability to assess and critically analyze media content, such as news, advertisements, and social media. Media literate individuals can identify bias, misinformation, and persuasive techniques.

The US Partnership for 21st Century Learning (P21), CBSE (2020) have classified the above stated 21st century skills in three sets of skills (i) learning skills, (ii) life Skills and (iii) literacy skills as shown in Figure 1.

These 21st-century skills are often seen as essential for success in education, the workforce, and everyday life in the digital age. Educational institutions and employers increasingly emphasize the development of these skills to prepare individuals for the challenges and opportunities of the modern world.

Figure 1

Classification of 21st Century Skills



Role of 21st Century Skills in Professional Development of Teachers

21st-century skills not only benefit educators personally but also have a significant impact on their effectiveness in the classroom. These skills are highly important for the professional development of teachers. The field of education is constantly evolving with new teaching methods, technology, and curricular changes. Teachers need to be adaptable to these shifts and open to incorporating new strategies and tools into their teaching practices. Technology plays a vital role in modern education. Teachers who possess digital literacy and technology skills can effectively integrate technology into their lessons, making learning more engaging and relevant for students. Further, Critical thinking and problem-solving ability of teachers help them to analyze student performance data, identify learning gaps, and adjust their teaching methods accordingly. Moreover, Effective communication skills are essential for teachers to convey information clearly to their students, colleagues, and parents. Teachers with strong communication skills can foster better

relationships with students leading to improved classroom outcomes. At the same time effective communication with colleagues helps in development of good rapport and teamwork among educators. As teachers have to often work in teams or collaborate across subjects to create interdisciplinary lessons. The ability to collaborate enhances the exchange of ideas and the development of effective teaching strategies. Effective communication and interpersonal skills are essential for building strong relationships with parents and the community. Engaging parents and community members can lead to better support for students' learning. Effective communication is one of the key elements of leadership and leadership skills enable them to not only guide and mentor students but also for guiding colleagues, mentoring new teachers, and participating in educational initiatives.

In today's diverse classrooms, teachers need to be emotionally and culturally aware and sensitive to the backgrounds and perspectives of their students. Understanding different cultures and global issues enables teachers to create inclusive and culturally responsive classrooms. Teachers possessing emotional intelligence can better understand and manage their own emotions and those of their students. This skill helps create a positive and supportive classroom environment that enhances the learning experience. To meet the needs of diverse learners, teachers must possess creativity and innovation skills, it assists them in developing innovative teaching methods, creating engaging lesson plans, and adapting new approaches.

Teachers need to be lifelong learners to stay current with best practices in education. The ability to learn independently and seek professional development opportunities is crucial for their growth and effectiveness as educators. Incorporating professional development programs that focus on these 21st-century skills can empower teachers to excel in their roles and provide high-quality education that prepares students for success in the modern world. Teachers are not only

educators but also role models for their students. Demonstrating 21st-century skills such as critical thinking, adaptability, and a growth mindset can inspire students to develop these skills themselves.

Shroff (2012) stated that developing a self-concept as a deserving and contributing member of society is the main goal of life skill education for students. Character building is a crucial component of value-based education since it guarantees a person's holistic development and enhances knowledge acquisition as well as "social skills, emotional balance, time management skills, financial literacy, health consciousness, and problem-solving skills, among others." It is necessary to instill moral qualities such as values, kindness, tolerance for other cultures and cuisines, courage, honesty, and respect for others. It is easier for the child to assimilate these skills if they are taught at a young age. Shroff (2012) further questioned on how to deliver these skills in classroom and answered it as "To deal with such questions and situations the teaching fraternity must be trained to appreciate and measure academic work, give quantitative marks and at best, write qualitative report. Unless mindset of the teachers undergoes a sea change, life skills teaching like many other concepts will remain a white paper presentation."

Integration of Technology in the Development of 21st Century Skills

Technology can be a powerful tool for enhancing 21st-century skills in education, the workplace, and everyday life. The use of digital technologies drives innovation and fosters creativity (Ramaila & Molwele, 2022). The advent of digital tools and technology in recent times has provided a plethora of online activities that foster divergent thinking; such as creative writing, graphic design, animation, and effects to communicate specific messages, The use of digital technologies in the classroom allows for the acquisition of new knowledge, skills, and experiences by both teachers and students. (Demir & Akpınar, 2018). In this digital era with the speedy

evolution and inclusion of technology into routine lives, individuals are now enabled to communicate through huge variety of digital tools and technology, globally. Technological advances have provided number of ways and means to communicate such as mobile phone, email, videos, social media and more. The line in-between digital and in-person communication are fading. Computational thinking, a crucial 21st century skill, aids students in responding to problems they encounter on a daily basis (Haseski et al., 2018; Weintrop et al., 2016). The focus of computational thinking is on the concepts, tactics, and mental processes that students might employ to address particular issues. It is important to pay closer attention to how technology integration and the growth of 21st century skills and capabilities interact. The extent to which digital technology can support the development of 21st century skills and competencies in the classroom varies. Personalized learning is a feature of digital technology, claim Cheung et al. (2021). The usage of numerous programs that enhance the quality of instruction in the classroom improves personalized learning.

These technologies provide information about a person's behavior, performance, and learning. Digital literacy influences the ways in which technologies can be integrated to create intelligent learning environments. The digital convenience needed for the development of 21st century skills and competencies are provided in computational classrooms. A variety of material can be accessed by students using tools, and they can participate in technology-focused classrooms, which have been made feasible by technological breakthroughs and their effective use (Yilmaz, 2021). Through the use of computer instruments, students can learn information and practical skills like flexibility, adaptability, creativity, critical thinking, and technology literacy (Yilmaz, 2021). Technology can be used to foster the development of these skills in many ways some of them have been discussed below.

Critical Thinking and Problem Solving- Online research tools and databases provide access to vast amounts of information, helping individuals gather data and evidence to support their critical thinking. Simulation and modeling software allow users to experiment with complex systems and explore cause-and-effect relationships. Analytics tools can help individuals analyze data and identify trends or patterns to inform decision-making.

Creativity and Innovation- Creative software tools, such as graphic design, video editing, and music composition software, enable users to express their creativity. Online platforms and communities can facilitate collaboration and idea sharing among creative individuals from diverse backgrounds. Crowdsourcing and crowdfunding platforms can help turn innovative ideas into reality by connecting creators with resources and support.

Communication- social media, email, and messaging apps enable instant communication and collaboration with individuals around the world. Video conferencing and webinar platforms allow for face-to-face communication and presentations, even across great distances. Blogging and podcasting tools offer platforms for individuals to share their thoughts and ideas with a global audience.

Collaboration and Teamwork- Collaboration software and project management tools support teamwork by allowing team members to coordinate tasks, share documents, and track progress. Online collaboration platforms enable virtual teams to work together on projects regardless of their physical locations. Cloud-based document sharing and editing tools facilitate real-time collaboration on documents and presentations.

Information and Media Literacy-Search engines and online databases provide easy access to a wealth of information, but technology can also help users learn how to evaluate the

credibility and reliability of sources. Fact-checking websites and plugins can assist users in verifying the accuracy of information they encounter online. Educational apps and games can teach information literacy skills in an engaging and interactive way. Media literacy courses and workshops can help individuals develop critical thinking skills to analyze media content.

Digital Literacy and Technology Skills- Online courses and tutorials can help individuals acquire and improve their digital and technical skills. Digital literacy programs can teach users about internet safety, cybersecurity, and responsible online behavior. Online learning platforms and Massive Open Online Courses (MOOCs) offer flexible learning opportunities that allow individuals to adapt their education to their schedules. Virtual reality (VR) and augmented reality (AR) technologies can create immersive learning experiences that expose individuals to new environments and situations.

Cultural and Global Awareness- social media and online communities can connect individuals with people from diverse cultures and backgrounds, fostering cultural awareness and understanding. Language learning apps and online courses can help individuals acquire language skills and better communicate with people from different parts of the world.

Emotional Intelligence- Virtual reality simulations and games can help users develop empathy by putting them in the shoes of others and experiencing different perspectives. Online mental health resources and apps can assist individuals in managing stress and improving emotional well-being.

Resilience and Grit: Mindfulness and meditation apps can teach stress management and emotional resilience techniques. Online support groups and communities can provide a sense of belonging and encouragement during challenging times.

By integrating technology effectively into education and everyday life, individuals can develop and enhance these 21st-century skills, enabling them to thrive in our increasingly digital and interconnected world.

Technological Tools to Enhance The 21st Century Skills of Teachers

There are numerous technological tools and resources that can be used to enhance the 21st-century skills of teachers. These tools can support professional development and help educators acquire and strengthen these skills. Here are some technological tools and platforms that can be beneficial for the development of 21st century skills in teachers.

- 1. Online Learning Platforms-** Platforms like Coursera, edX, and LinkedIn Learning offer a wide range of courses on topics related to 21st century skills, including critical thinking, digital literacy, and leadership.
- 2. Webinars and Virtual Workshops-** Webinar platforms such as Zoom and Microsoft Teams allow teachers to attend virtual workshops and seminars on various topics. These platforms also offer opportunities for interaction and collaboration.
- 3. Learning Management Systems (LMS)-** LMS like Moodle, Canvas, or Google Classroom can be used to create and deliver online courses and materials for teachers to develop their skills at their own pace.
- 4. Educational Blogs and Podcasts-** Teachers can follow blogs and podcasts that focus on education, technology, and professional development. Tools like RSS readers or podcast apps can help curate relevant content.
- 5. Social Media-** Platforms like Twitter and LinkedIn are excellent for connecting with other educators, participating in educational chats, and sharing resources related to 21st century skills.

- 6. Professional Learning Networks (PLNs)-** Websites and apps like Edmodo, Ning, or Schoology provide spaces for teachers to join communities, share ideas, and engage in discussions with peers and experts.
- 7. E-Books and e-Textbooks-** Digital books and resources can be easily accessed and updated, providing teachers with the latest information and insights on 21st century skills.
- 8. Online Collaboration Tools-** Tools such as Google Workspace (formerly G Suite), Microsoft Office 365 etc. can facilitate collaboration among teachers, enabling them to work together on projects and share ideas.
- 9. Video Conferencing Tools-** Platforms like Google meet, Zoom, Microsoft Teams can be used for immersive professional development, virtual conferences, and virtual classroom visits.
- 10. Online Assessment and Feedback Tools-** Platforms like Kahoot!, Quizlet, or Formative can be used to create interactive assessments that measure teachers' knowledge and skills in various areas.
- 11. Digital Note-Taking and Organization Tools-** Apps like Evernote, OneNote, or Notion help teachers stay organized, take digital notes, and manage resources related to their professional development.
- 12. Data Analytics and Reporting Tools-** Teachers can use data analytics tools to assess student performance and identify areas for improvement, enhancing their ability to make data-informed decisions.
- 13. Online Communities and Forums-** Websites like Reddit or specialized education forums provide spaces for teachers to ask questions, share experiences, and seek advice from their peers.

14. Augmented and Virtual Reality (AR/VR)- AR and VR applications can immerse teachers in various scenarios to enhance their empathy, cultural awareness, and understanding of global issues.

It's important to note that the choice of technological tools should align with specific professional development goals and the skills teachers aim to enhance. Additionally, ongoing support and training in using these tools effectively can be beneficial to ensure that teachers can maximize their impact on professional growth.

The Government of India has recognized the importance of professional development for teachers and has implemented various provisions to support their growth and enhance the quality of education. These provisions are aimed at improving teacher training, upgrading their skills, and promoting continuous learning. Many of these initiatives leverage technology to provide training, resources, and support to educators, helping them improve their teaching practices and stay updated with modern educational techniques. Some of the key Information and Communication Technology (ICT) initiatives for teacher professional development in India includes DIKSHA (Digital Infrastructure for Knowledge Sharing), SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds), SWAYAM PRABHA, National Repository of Open Educational Resources (NROER), e-PG Pathshala, National Digital Library (NDL), National Initiative for School Heads' and Teachers' Holistic Advancement (NISHTHA), Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT) etc. These ICT provisions are aimed at empowering teachers with the digital skills and resources needed to enhance their teaching practices and deliver high-quality education to students. They support the government's efforts to modernize education and promote digital literacy among educators. These provisions and initiatives reflect the government's commitment to improving the quality of education in India by

investing in the professional development of teachers. The goal is to equip teachers with the skills and knowledge needed to provide high-quality education and foster positive learning outcomes for students across the country.

Conclusion

Ever since its egression, the endless world of digital technology is influencing our lives in multitudes of fashions. It has changed almost everything from our mundane activities and tasks, to the way we interact with others, the way we work professionally and the way we spend our leisure etc. Our society has transformed into an information society due to advancements of technology; and with this fast-pacing technology the skills required to live in this technology driven information society are also changing rapidly. “The sky is the limit”, when it comes to learning and with the rapid growth of the “virtual world” the need for teachers with the skills to be able to teach both in face-to-face mode in classroom environment as well as in online environments, who may inculcate the necessary 21st century skills in the students, are in high demand. Thus, it can be said that in order to effectively teach students in all of these subjects, a teacher need to be receptive to learning on how to incorporate digital tools and technology in pedagogy in addition to 21st century skills. Let the teachers be armed first and then allow them to practice what they have learnt; as teachers who model these skills can help students develop them, setting them up for success in their own future careers.

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