



Techno-Pedagogical Competence : Challenges and Resolving Measures for Teachers

Mr. Ravinder Singh
(Research Scholar)

Dr. Sushma Gupta
(Assistant Professor)

Department of Education
Kurukshetra University, Kurukshetra

Abstract:

Techno-pedagogical skills are the means through which teachers can impart quality education that is both accessible and inexpensive. All the institutions of learning in the country should have access to internet connectivity, valuable information, and low-cost computing devices. The techno-pedagogical competency assists in the development of linguistic abilities, the creation of multi-grade education and the sketching of specific pedagogy with advanced study resources. Teachers' face several challenges of techno-pedagogy including lack of technological infrastructure, English language proficiency and online content professionalism, supportive environment, incentives, motivation and awareness among teachers, research & development problems, difficulty in using software & hardware, techno-pedagogical resources scarcity, coordination problem among various educational departments, and problems of frequent electric power outages and fluctuations. These all can be overcome through improving infrastructure, English language proficiency and online content enrichment, resolving teacher crises, improving teachers incentives, motivation and awareness; resolving research & development, knowledge about existing techno-pedagogical products & services, using licenced software, by using techno-pedagogy supportive resources, improving departmental coordination, and eliminating frequent electric power outages and fluctuations. As for realizing the many previous research studies related to techno-pedagogical competence, the present paper discusses the challenges and resolving measures regarding techno-pedagogical competence of teachers in the teaching-learning process.

Keywords: Education, Teachers, Techno-pedagogical Competence, Challenges, Resolving Measures.

I. Introduction

Education is a systematic process of obtaining ability and knowledge through formal and informal modes. Every movement of life gives a new experience, new teaching to an individual. It shapes the personality of an individual. It will not be wrong to say that "life is education and education is life".

The twenty-first-century man has been blessed with new technology by providing new methods, techniques and tool that makes his life easy and comfortable. Technology is not only making its presence felt in almost every field of human life but also education. Education now eyewitness of paradigm shift from the era of traditional teaching methodology to digitized pedagogical approach through developed technology. The concept of the traditional classroom has been changed to a digital teaching-learning process. Technology-enabled learning environments have become the most important point of concern for the education system and its effectiveness. It has spearheaded a large volume of literature in classroom learning experiences and teacher' participation. Technology has become an important resource for both teachers as well as learners. The teacher, who mould the future of students has an important place in the education system. The use of technology in the teaching-learning process has become much important to make it effective and productive. Therefore, it is essential to teachers have basic technology skills and competencies. Education is associated with ICT in the

digital era where we are living. Technology helps the learner in self-learning and personalized learning formally and informally. The teachers are using digital technologies to enable the students with more personalized experiences. The growing technology has defined teaching-learning in a new way and it has given a new outlook to the classroom that changed the pedagogy completely. Therefore, it is essential to integrate the teachers with technology in the classrooms. New scientific and technological innovations are taking place; there is a need to be implemented these in the field of education. Technology pervades all walks of life and almost every field of human endeavour. So, technological skills are becoming essential in all subject areas because the computer is now the universal vehicle for the acquisition and dissemination of information. It is closely related to the process of innovation and transformation of knowledge as a useful product. This process requires creative and multitalented people, who can use it effectively and efficiently in the field of education. The major challenges to be encountered of technological integration in education. Research revealed the inclusion of techno-pedagogical skills in education has been improving throughout the world. These techno-pedagogical skills and their proper use only can break down the barriers that lead to underachievement, student disaffection and educational exclusion. Students and teachers have expected that information to be accessible, instantaneous, and multidimensional for their progress and effective teaching-learning.

II. Conceptual Framework

Techno-Pedagogical Competence

It is a combination of three words technology, pedagogy and competence; here **Techno** means **technology**, **Pedagogy** means **to lead the child** and **Competence** means **the ability to do something successfully or efficiently**.

Technology: - it means art, skill, craft, or the way, manner, or means by which a thing is gained. it creates an understanding of how to use computer software and hardware such as the internet, digital video and common technologies including OHP, interactive or smart boards and e-books in education.

Educational Technology: - Both terms, Education and Technology are interrelated to each other. Educational Technology is the application of the theories and laws of science and technology in the education system. It can be said that it is the application of scientific methods and techniques in education. It is generally considered as an intermixing of two aspects- *technology of education* and *technology in education*.

Competence: - In a general way it means the ability to do something successfully or efficiently. Competence is defined as “adequate for the purpose, suitable, sufficient or as legally qualified, admissible or as capable”. Capability, ability, proficiency, expertise, skill etc. All are synonyms of competency.

Technological Competence: - It means the capability, ability, proficiency, expertise, skill to use technology or technological methods and equipment’s to do something successfully or efficiently. It supports teachers in numerous ways first and foremost in stimulating learning beyond the classroom.

Pedagogy: - The term pedagogy is derived from two Greek words *paid* and *agogos*, here the former denotes the child and later denotes the leading or how to lead. So, it means “to lead the child”. finally, it can be said that it is the art and science of teaching pupils. It informs teaching strategies, teacher activities and teacher judgments and decisions about theories & methods of learning, understanding students & their needs individually.

Pedagogical Competence: - Pedagogy is an art of teaching. The use of best pedagogy in the classroom encourages the well-being of the individual as well as the community. It includes knowledge about different “alternatives instructional methods”. Pedagogical competence is based on perfect, extensive, comprehensive and current knowledge of the subject matter, learning and subject-based teaching and learning issues.

Techno-pedagogical competence: - it can be defined as the use of technology in teaching-learning situations. It is that skill that is used by teachers effectively to integrate technology and pedagogy within the classroom. Teachers having competency in techno-pedagogy integration can bring the entire world into the classroom. The advancement in techno-pedagogical knowledge has given birth to the latest concepts of online learning like LMS, MOOCs, MOODLE are the best examples of incorporating technical knowledge in pedagogy. There are three areas of knowledge in techno-pedagogy, namely: content, pedagogy, and technology.

III. Importance of Techno-Pedagogical Competence for Teachers

The emergence of new technology has influenced every aspect of human life. Without technology and the techno-pedagogical competent teacher are inconceivable in today's classrooms. Due to the developments and evolution, standards of learning would be higher in the 21st century than it has been in the 20th century. To prepare the students to navigate the 21st-century world they must be exposed to technology-based instruction in the classroom. For the survival and success of the future of the school environment, teachers should be techno-pedagogically competent in both general and specific senses because teachers play a vital role in realizing the educational goals of a dynamic society. Teachers' holds the most crucial position and help in the success of any educational system. A teacher is the topmost academic and professional person in the educational pyramid who shapes the future of students and the quality of the education system. Faculty must possess a comprehensive and ever-changing set of technological skills, as well as the ability to select relevant techno-pedagogical tactics to effectively engage students.

IV. Role of Techno-Pedagogy in Education

Applications of the techno-pedagogy in the educational process can be categorized such as it helps to

- Improve linguistic competencies.
- Develop the teaching-learning process.
- Improve study materials for teaching and learning.
- Introduced multi-grade instructional programmes.
- Organize a specific pedagogy and curriculum.
- Support in Distance Education through e-learning, mobile learning, and online learning.
- Provide guidance and counselling services for career development.
- Boost Self Learning hobbies among students.
- It improves the enrolment and examination processes.
- Assist in conducting research programs.
- Reinforce for cognitive learning.
- Develop aesthetic sensibility through technology.
- Cultivate educational values among teachers and students.
- It makes a significant contribution to Special, Health, Yoga and Environmental Education.

IV. Techno-Pedagogy Challenges in Education

Globalization is solely due to education. It is undeniable that techno-pedagogy improves education over traditional education, however, there are various techno-pedagogical challenges in the education system before the teachers, which are as:

• **Lack of proper infrastructure for implementing Techno-pedagogical skills-**

Several institutions lack the necessary facilities or infrastructure to incorporate technologies. The obstacles of using techno-pedagogical skills in the education system are created by miserable labs that have rarely used web-based instruction, electronic equipment such as telephones, cell-phones, fax machines, radio & television, audios & videos players, computers, cable networks, e-mail, hardware and software, poor communications satellites, injure videoconferencing, and so on.

• **English proficiency with web-based content-**

English is the most widely used language on the internet. English proficiency is low in our country, particularly outside of the metropolitan area. This is a big obstacle to fully utilising the World Wide Web for educational purposes.

- **A calamity of Teachers with Techno-pedagogical skills-**

Education still faces a significant technological-pedagogical problem even though interpersonal communication requires much more mastery on the part of teachers with digital literacy. The common failures in incorporating techno-pedagogical competency into classroom instruction are: adopting learning technology without considering the requirements of students and the availability of content; enforcing advanced technologies from the top to bottom without engaging teachers and students; using unsuitable material from other parts of the world without appropriately altering it, and generating poor quality content with poor instructional strategies and which not adjusted to the pedagogical context.

- **Lake of motivation for teachers-**

There is a minimal incentive for teaching staff to commit to changing their pedagogical practices from the chalkboard to techno-pedagogical approaches through Technology or web-based learning, besides the obstacle of teacher knowledge.

- **Research and Development Malpractices-**

For extensive formative research, techno-pedagogical skills need a solid research foundation. For this reason, only two-way communication (two-way audio and two-way video) is more effective than one-way communication.

- **Technological-Pedagogical Skill Services Unawareness-**

Institutions provide a diverse range of ICT infrastructure for the advancement of Techno-pedagogical capabilities. However, it appears that students, particularly educational professionals, are unaware of the wide range of digital resources that are available for them.

- **Major Software-related hurdles-**

Unlicensed software, i.e. pirated software in standard formats, is widely used since it saves money on maintenance and eliminates the legal issue of using Technology in multiple institutions. Even if licenced hardware and software are available, deployment is challenging due to a lack of capacity in equipment maintenance.

- **Techno-pedagogical resources are limited-**

Improper use of multimedia resources in blended instructional approaches leads to poor student achievement, contributing to Digital illiteracy among students at different levels of education.

- **There is a lack of collaboration across departments-**

There is a lack of cooperation across academic institutions, colleges, and departments. The institution creates separate websites that do not bridge each other, resulting in the institutions, schools, and departments only sharing a portion of information for students.

- **Power outages and fluctuations problems-**

The power failures and fluctuations harm the use of techno-pedagogical competency. It became the cause of failure for computers and other equipment.

V. Challenges Resolving Measures for Teachers

The innovative utilisation of techno-pedagogical abilities has the potential to tackle education-related challenges as a consequence of globalization. Despite the complexities described above, there are ways to avoid meeting obstacles by using Technology to promote techno-pedagogical competencies in education.

- **Infrastructure Development:-**

There is a need to establish suitable human and physical infrastructure, as well as a media environment. To accommodate the technology, institutions will need to provide sufficient facilities or structures. Appropriate techno-pedagogy-supporting labs with technological tools such as phone lines, cellphones, fax machines, radio & television, audio & video players, computer systems, cable network,

internet connections, e-mail, hardware and software, satellite systems, sound video conferencing, and so on should be readily accessible. Furthermore, there must be facilities to access the internet at any time, rather than relying on telephone services, cable networks.

- **Improvement of English language & internet content proficiency:-**

Because English is the most commonly used language on the internet, competency in it must be improved. In this way, the full potential of the World Wide Web can be realised and utilised.

- **Techno-pedagogical skills development:-**

Techno-pedagogic abilities are required for mediated instruction. Teachers must transition from pedagogues to techno-pedagogues through training services and educational programmes. Micro-teaching, media skills, and techno-pedagogic abilities should be properly integrated. As a result, teacher educators and teachers should participate in programmes to improve their Technological literacy and Techno-Pedagogic competencies. At various levels of teacher education, there is an immediate need to identify Techno-Pedagogic Competencies and educate trainee teachers with these skills.

- **Dissolve the crisis of teachers with techno-pedagogical skills:-**

Teachers must be active in conducting training, workshops, and designing specific techno-pedagogical skills using ICT to assure their relevance and efficacy in teaching-learning and research. Training programmes should be arranged to ensure the implications of technology adoption and its comprehensive use in teaching and learning.

- **Effective Incentives for Teachers' Motivation:-**

All stakeholders involved in the groundwork of techno-pedagogical competencies need to be trained. Teachers should be incentivized by monetary or non-monetary forms for devoting attention to transitioning from the chalkboard to hybrid, or innovative instructional techniques. When incorporating techno-pedagogical competencies, it is very essential to give preliminary training for teachers.

- **Research & Development Resolution:-**

For this purpose, a solid research background is essential. For this kind of two-way audio and video, communication must be formed. On the other hand, educational institutions should arrange digital resources in such a way as digital libraries, that the students, professors, and professionals can access research and content matter from any location and at any time.

- **Awareness of existing technological-pedagogical services:-**

Though institutions provide a diverse range of opportunities for utilising techno-pedagogical competencies. As a result, there appears to be a healthy understanding of the variety of digital options available to teachers. The development of low-cost, low-power access devices, as well as the networking of all educational institutions, should be prioritised.

- **Proper solutions must be done for using different software:-**

To avoid such issues, clear policies and procedures for acquiring computer hardware and software are required. It should be illegal to utilise unlicensed or pirated software in standard formats. As a result, to utilise it in higher education, the educational institutions must set up appropriate equipment maintenance capabilities.

- **By using imperishable techno-pedagogy supportive resources:-**

Sharing infrastructure resources, innovations, and instructional materials might help to cut down on development costs. Instructional material in different forms like audio cd's, videos, CAI material, radio programmes, tv programmes and digitally instructional resources should have been developed. In addition, governments and educational institutions will need to adopt plans for effective digital policies, their

deployment and sustainability. Superior learning outcomes for pupils are to be the result of effective techno-pedagogical skills.

- **Improve inter-departmental coordination:-**

Across institutions, universities, and departments, there should be cordial interaction and coordination. As a result, if the university establishes separate websites for colleges and departments, cross-references between them are required to communicate information with students. To ensure fully electronic universities and digital campuses, higher authorities like MHRD, the Department of Information Technology, and the Department of Telecommunication would work in coordination.

- **Removal of problems related to electricity:-**

During a power loss, an uninterruptible power supply (UPS) can be utilised to save data. As a result, educational institutions must have electricity infrastructure upgrades in place to combat frequent power outages and fluctuations, such as solar, hydro, wind, wave, or biogas energy projects.

- **Creation of technologically and pedagogically sound E-Content**

Best practises in the creation of techno-pedagogical E-content, as well as its dissemination, selection, and assessment criteria should be recognised and resolved.

- **Techno-pedagogical training and education for teachers:-**

Educational Technology (ET) and Information and Communication Technology (ICT) in Education should be given as core courses at all stages of teacher education. Longer-term Teacher Education certificates and degree programmes dedicated to these disciplines must be provided. There should also be refresher courses and workshops in ET and ICT. Digital education preparation and implementation should be encouraged in all teacher education programmes.

- **Computer-Based Learning Resources Management Systems:-**

Every educational institution's library should provide learning resources in a range of media types, such as CDs and video films. Teachers will be able to combine materials for the formation of a techno-pedagogical environment as libraries are gradually turned into digital libraries.

- **Designing websites for online content:-**

Web pages should be created to educate diverse subjects using technological pedagogical content knowledge. On a variety of themes, CDs based on technological pedagogical skills should be provided as a web resource.

- **Make the existing ICT services more accessible:-**

A public relations campaign would serve to enhance the impact of comprehensive techno-pedagogical competence through ICT training. Existing events or platforms (such as student orientation or departmental meetings) could be used in the campaign. KNUST, for example, already has a vibrant Facebook group.

VI. Conclusion

Techno-pedagogy is a fundamental deciding factor in the composite meta-teaching approach. Over a previous couple of years, advancements in techno-pedagogical capabilities have been introduced into education systems over the world. Several of the obstacles that lead to academic failure, learner dissatisfaction, and educational marginalization can be broken down through the use of techno-pedagogical competencies. Whenever one examines outside, however, it is apparent that almost all institutions and organizations throughout the country are unable to achieve success. Even though measures to enhance the function of techno-pedagogical competencies in the education system have been given preference in preparation and implementation, an investigation of the present situation discloses several factors that have hampered the technology integration in the educational sector. In addition to technology policy, governments and higher authorities will need to build strong and effective plans for techno-pedagogical skills improvement, implementation and sustainability.

Finally, technology will never be a replacement for effective instruction. No electronic transmission can obtain beneficial results except if the teachers are techno-pedagogically competent.

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