



TECHNOLOGICAL COMPETENCIES OF TEACHERS FOR THE USE OF ICT

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Abstract:

The goal of the current research was to pinpoint the skills instructors will require to create and execute ICT-based curricula. The study used the survey technique of research. To determine the ICT-related competences that instructors require for instructional purposes, a rating system was utilised. 37 components made up the evaluation scale, which was based on three different categories of teacher competencies: technological, pedagogical, and didactic. There were 100 teacher educators in the sample, 60 of whom were men and 40 of whom were women. Email and direct contact with the respondents were used to gather the data, which was then evaluated using frequencies and percentages. The study's findings show that all teacher educators concurred that teachers need to develop the following ICT competencies: I Utilize your ICT abilities to create and display information; (ii) set up an ICT-based learning environment by planning effective learning activities and building rich learning environments with the aid of ICT; and (iii) be aware of the ways in which computer technology may improve student learning. The use of ICT as a didactic tool entails using it to develop engaging and efficient instructional strategies and environments, as well as (iv) demonstrating knowledge of and skills for using technology in an ethical, legal, and secure manner while using humour and good manners throughout the teaching and learning process.

Introduction:

Clearly, information and communication technologies (ICTs) have a significant impact on education. It is imperative that ICTs be integrated into education in general and teacher preparation specifically. Numerous experts and academics, including BECTA (2004), Akudolu (2002), Sharp and Potter (2002), and Olibie (2002), have thoroughly demonstrated the huge advantages of ICT (2003). In modern age, when information is developing quickly and much of it is accessible to both students and instructors at the same time, teaching is quickly becoming one of the most difficult professions. Teachers are now required to support learning and make it relevant for each student rather than merely impart information and skills since new notions of learning have emerged. While modern technological advancements have opened up new career opportunities for teachers, they have also increased the burden on them to become proficient in the use of this new technology in the classroom. The teacher's conventional function has altered as a result of the speed of the technological revolution and the advent of a knowledge society. The instructor has

historically been the sole source of information for the pupils. The internet's influence on education in recent years has encouraged the idea of an accessible, global, and adaptable learning environment. The teacher's function in this educational environment is to serve as a guide and tool to ensure a thorough learning process using current technology and to manage the students' learning process using new instructional models placed in freshly developed virtual environments. As a result of changes in teaching and learning paradigms, the teacher will need to acquire abilities relating to learning contexts. ICT competences, according to authors like Potter and Darbyshire (2005) and UNESCO (2004), are concerned with the capacity to:

1. Know when to utilize or develop certain ability in using an ICT resource;
2. Approach learning with technology with a critical and confident attitude.
3. Be aware of the benefits of ICT and how it affects both users and other parties.

Competency Framework for Teachers:

Technology, pedagogical, and topic knowledge are crucial for instructors to have in order to successfully integrate ICT in the classroom,

claim Mishra and Koehler (2006). The researcher created an ICT competence model for instructors after carefully reviewing the literature. ICT instructional usage requires three different sorts of competences to be effective. Technical Competencies (TC), Pedagogical Competencies (PC), and Didactical Competencies (DC) are these four competencies .

(1) Technological ICT Competencies: These skills are connected to instructors' technical training and understanding of how to operate and maintain ICT hardware and software. These abilities include the ability to use contemporary technology like computers, the Internet, etc.

(2) Pedagogical ICT Competencies: It is necessary to create applications for their fields that effectively use ICT to support and advance teaching and learning. for instructors to demonstrate their pedagogical competences, which are tied to their instructional practises and understanding of the curriculum. This kind of knowledge is broad and applies to all aspects of student learning, classroom management, the creation and execution of lesson plans, and student assessment. It comprises information about instructional tactics or procedures, the makeup of the intended audience, and tools for gauging students' comprehension.

(3) Didactical ICT Competencies: These abilities are related to the teacher's knowledge of the material that will be taught or learned. The essential concepts, theories, and facts of the subject, the explanatory frameworks that connect and organise ideas, and the standards of evidence and proof are all things that teachers need to be familiar with. Teachers must understand the nature of knowledge and research across a variety of fields.

Objectives:

The main objectives of the study were:

1. To know the Technological ICT Competencies that teacher need for instructional purpose.
2. To know the Pedagogical ICT Competencies that teacher need for instructional purpose.
3. To know the Didactical ICT Competencies that teacher need for instructional purpose.

Methodology:

(a) Research Method:

Survey method of research was employed for the present study.

(b) Sample of the Study:

100 teacher educators from different colleges and universities' schools of education make up the sample. There were 40 females and 60 men (60%) among the study's participants (40 percent).

(c) Variables in the Study:

The three different categories of ICT competencies—technical, pedagogical, and didactical competencies—were chosen as the study's variables.

(d) Tool Used:

The researcher created a four-point grading system to determine the ICT-related competences required by instructors for educational purposes. The grading system had four categories, namely technical competences, pedagogical competencies, didactical competencies, and ICT instructional use competencies. A four-point rating scale with 37 items that ranged It ranged from highly agree to strongly disagree. Table 1 provides an explanation of the grading system and its three categories of skills.

Table 1: Description of the Rating Scale

Section	Teacher Competency Group for Instructional Use of ICT	Total Items
A	Technological ICT Competencies	15
B	Pedagogical ICT Competencies	12
C	Didactical ICT Competencies	10
Total		37

(e) Data Collection Method:

A personal contact was made to the respondent in order to collect the data, and copies of the rating scale were also given to the respondent. To entice some of the responders to complete the rating scale, they were physically or verbally approached once more. The instrument was completed and 100 copies were returned (60 by personally and 40 by e-mail).

(f) Analysis of Data:

Obtained data were analyzed with the help of simple percentage.

Analysis and Interpretation:

The replies provided by the teacher educators on the rating scale were examined to determine the ICT abilities that teachers must acquire. The proportion of teacher educators who strongly agree, agree, disagree, and strongly disagree with each competence of the technical, pedagogical, and didactical competency group was attempted to be observed. The results are shown in tables 2, 3, and 4 below.

(A) Technological ICT Competencies of Teachers for Instructional Use of ICT:

Table 2 below presents the findings of the technological ICT abilities that teachers need to build in light of teacher educators.

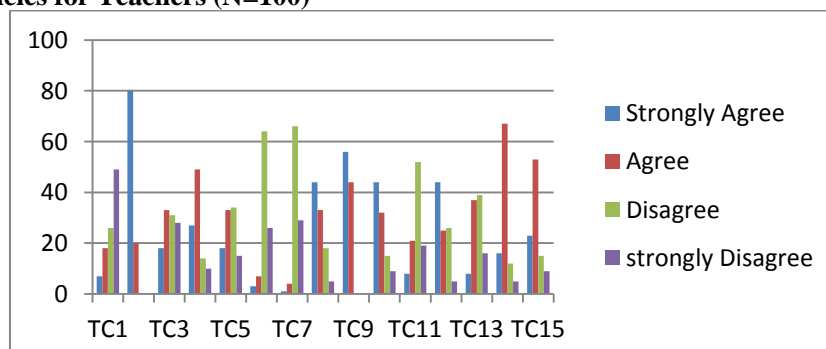
Table 2: Teacher Educators Views on the Technological ICT Competencies that Teachers Need for Instructional Purpose

Item No.	Items	Strongly Agree		Agree		Disagree		Strongly Disagree	
		f	%	f	%	f	%	f	%
TC1	Varied operating system use	7	7	18	18	26	26	49	49
TC2	Using email	80	80	20	20	-	-	-	-
TC3	Utilizing multimedia	18	18	33	33	31	31	18	18
TC4	Using current computer hardware	27	27	49	49	14	14	10	10
TC5	Taking part in internet conversation	18	18	33	33	34	34	15	15
TC6	Hardware upgrades	3	3	7	7	64	64	26	26
TC7	Writing software for computers in general	1	1	4	4	66	66	29	29
TC8	Application of a range of software, including word processing, database, spreadsheet, and statistical software	44	44	33	33	18	18	5	5
TC9	Using ICT expertise to create and deliver information	56	56	44	44	-	-	-	-
TC10	Understanding of computer language	44	44	32	32	15	15	9	9
TC11	Establishing WebPages	8	8	21	21	52	52	19	19
TC12	Being able to perform and comprehend	44	44	25	25	26	26	5	5
TC13	Using many educational resources.	8	8	37	37	39	39	16	16
TC14	A thorough knowledge of computer hardware and software	16	16	67	67	12	12	5	5
TC15	Accessing the Internet	23	23	53	53	15	15	9	9

A maximum of 80 (or 80 percent) of teacher educators strongly agree with Item TC2 on the technical ICT skills, according to the data in Table 2. (Use of E-mail). The two questions on "Use of Email" and "Using ICT skills in creating and presenting information" had the highest proportion of perfect marks (for Strongly Agree and Agree). According to the respondents, instructors should be able to create and convey material using ICT, according to this data. The technical competencies TC2 (Use of Email), TC3 (Working with Multimedia), TC4, (Using Available Computer Hardware), TC5, (Participation in Online Discussion), TC8, (Use of Variety of Software Like- Word Processing, Database, Spreadsheet and Statistical Software),

TC10 (Familiarization with Computer Terminology), and TC12 (Ability in and Understanding of Fundamental Computer Operations and Concepts) are considered important by the survey respondents. These products got ratings of greater than 50%. The responder did not see the following technological abilities as teacher-required: TC1 (Use of multiple operating systems), TC6 (Hardware repairs), TC7 (Writing general computer programmes), and TC11 (Setting up websites). Figure 1 displays the proportion of times teacher educators said they were highly agree, agree, disagree, and strongly agree about the technical skills teachers must possess to utilise ICT for education.

Figure-1: Distribution of Frequency Percentage of Teacher Educators on Required Technological ICT Competencies for Teachers (N=100)



Technological ICT Competence

(B) Pedagogical ICT Competencies of Teachers for Instructional Use of ICT:

Table 3 below provides the findings about the pedagogical ICT abilities that teachers must build in light of teacher educators.

Table 3: Teacher Educators Views on the Pedagogical ICT Competencies that Teachers Need for Instructional Purpose

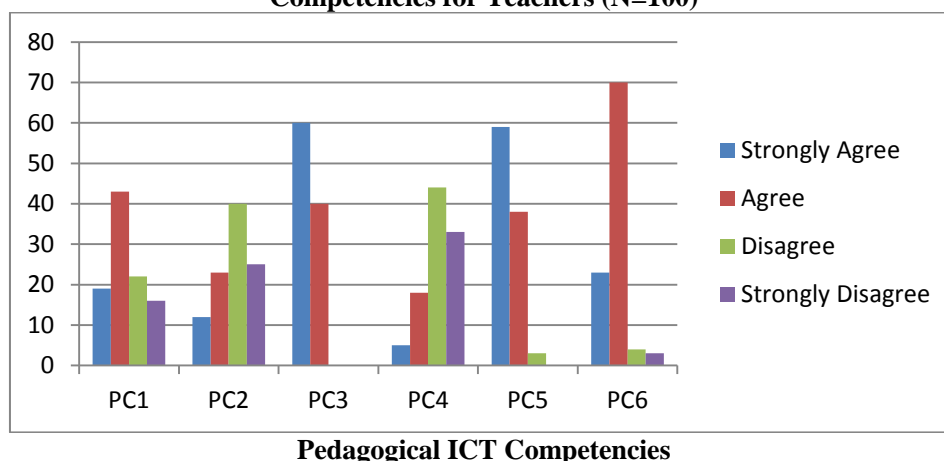
Item No.	Items	Strongly Agree		Agree		Disagree		Strongly Disagree	
		f	%	f	%	f	%	f	%
PC1	Select and evaluate subject-specific educational software	19	19	43	43	22	22	16	16
PC2	Develop and maintain educational website	12	12	23	23	40	40	25	25
PC3	Prepare ICT-based learning environment	60	60	40	40	-	-	-	-
PC4	Develop educational programs with the help of programming languages	5	5	18	18	44	44	33	33
PC5	Monitor and evaluate ICT-based teaching-learning process	59	59	38	38	3	3	-	-
PC6	Applying ICT supported strategies to manage students' learning	23	23	70	70	4	4	3	3
PC7	Designing effective learning experiences and creating rich learning environments with the support of ICT	49	49	51	51	-	-	-	-
PC8	Surfing the internet and locating useful information from the internet for the development of lesson plans	33	33	62	62	5	5	-	-
PC9	Integrate ICT in other subjects across the curriculum	59	59	29	29	9	9	3	3
PC10	Prepare schemes of work and lesson notes using ICT	37	37	44	44	11	11	8	8
PC11	Ability to explore and apply to suitability of ICT for cooperative learning and for peer interaction	52	52	34	34	8	8	6	6
PC12	Understanding of how computer technology can enhance student learning	47	47	53	53	-	-	-	-

No more than 60 (60%) teacher educators strongly agree with Item PC3 out of the 12 pedagogical skills, according to data in Table 3. (Prepare ICT based learning environment). Item PC3 received the highest possible score of 100 percent [for Agree (40%) and Strongly Agree (60%)]. This indicates that the respondents consider the use of ICT for information generation and presentation to be a critical instructional skill that teachers must expect. The highest score of 100 percent was awarded to PC12 (understanding how computer technology may support student learning) and PC7 (designing effective learning experiences and creating rich learning environments with the use of ICT) (for Strongly Agree and Agree). The relevance of educational abilities is mentioned by the responders. PC1 (Choose and assess educational software for a particular subject area), PC5 (Monitor and assess ICT-based teaching and learning processes), and PC6 (Use ICT-supported management techniques for

student learning) are the three PCs. ,PC8 (Surf the internet and find pertinent information for lesson plans), PC9 (Incorporate ICT in other subjects across the curriculum), and PC10 (Prepare schemes of work). These goods received ratings of more than 50%.

Both PC2 (create and manage educational websites) and PC4 (create educational applications using programming languages) were not seen by the respondents as essential pedagogical skills for teachers. Figure 1 displays the proportion of frequency when teacher educators indicated highly agree, agree, disagree, and strongly disagree with the pedagogical skills needed for teachers to utilise ICT in education. Figure 2 shows the percentage of times teacher educators agreed, disagreed, or strongly agreed that teachers require certain pedagogical abilities in order to utilise ICT in the classroom.

Figure-2: Distribution of Frequency Percentage of Teacher Educator on Required Pedagogical ICT Competencies for Teachers (N=100)



(C) Didactical ICT Competencies of Teachers for Instructional Use of ICT:

Table 4 below presents the findings about the didactic ICT competences that teachers should build in light of teacher educators.

Table 4: Teacher Educators Views on the Didactical ICT Competencies that Teachers Need for Instructional Purpose

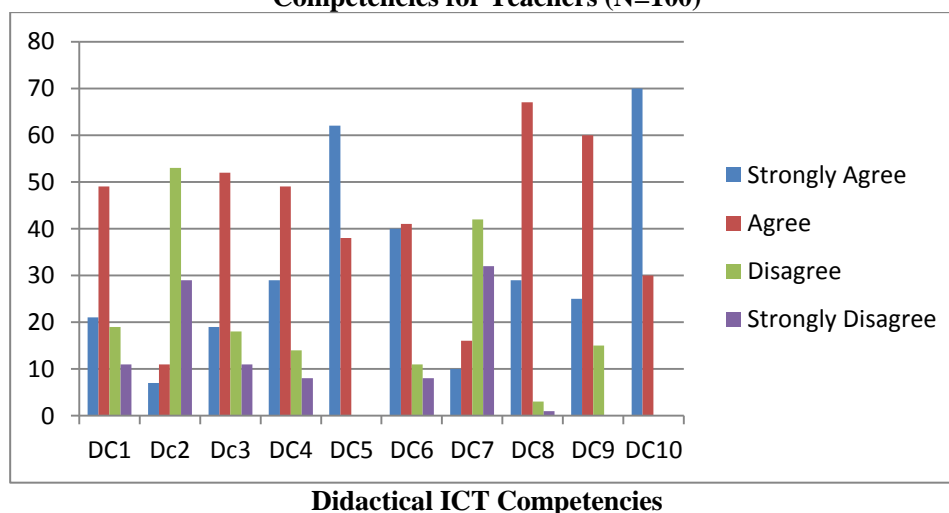
Item No.	Items	Strongly Agree		Agree		Disagree		Strongly Disagree	
		f	%	f	%	f	%	f	%
DC1	Make décisions about how to présent the content.	21	21	49	49	19	19	11	11
DC2	Créate materials and tools that adapt the use of ICT to students.	7	7	11	11	53	53	29	29
DC3	Decide how students will engage and what tools are best for a certain form of interaction (e.g. wikis for collaborative construction, blogging for conversation-type activities, etc.).	19	19	52	52	18	18	11	11
DC4	During the teaching and learning process, make plans for student assistance.	29	29	49	49	14	14	8	8
DC5	Use ICT as a didactical tool in the class.	62	62	38	38	-	-	-	-
DC6	Make methodology selections based on the students' prior knowledge and experience.	40	40	41	41	11	11	8	8
DC7	Create assessment and feedback opportunities that are tailored to the teaching and learning process.	10	10	16	16	42	42	32	32
DC8	Make activities with a focus on certain objectives. These activities are closely related to the information that has to be learned.	29	29	67	67	3	3	1	1
DC9	Understand how to establish and lead a community of learners using ICT technologies	25	25	60	60	15	15	-	-
DC10	Implement cooperative learning strategies using ICT.	70	70	30	30	-	-	-	-

According to the information in Table 4, the Item DC10 among the didactical ICT abilities has the strongest support from a maximum of 70 (70%) teacher educators (Implement cooperative learning strategies using ICT). The maximum score of 100 percent was given to item DC10 [for Strongly Agree (70%) and Agree (30%)]. This suggests that the respondents believe that utilising ICT to implement cooperative learning methodologies is a highly important didactic skill that instructors should demand. Additionally, DC5 (Use ICT as a teaching tool in the classroom) received the highest grade, receiving a perfect score (for Strongly Agree and Agree). The competencies DC1 (Decide how to present the content), Item DC3 (Decide how students will interact and which tools are appropriate for a given type of interaction, such as wikis for collaborative construction, blogging for conversation-type activities, etc.), Item DC4 (Plan student support during the teaching and learning process), and Item DC6 (Decide about

methodologies appropriate to prior knowledge) are seen as being crucial by the respondents. Two very important didactical competencies that modern teachers must master in order to successfully implement ICT in the classroom are DC8 (Know how to use ICT tools to create and facilitate a community of learning) and DC9 (Know how to use ICT tools to create and facilitate a community of learning). These activities closely relate to the knowledge that needs to be learned. These goods received ratings of more than 50%. The respondents did not see DC2 (offer resources and tools that adjust students' use of ICT) or DC7 (create feedback and assessment moments adapted to the learning and teaching process) as crucial didactical abilities for instructors.

Figure 3 shows the frequency with which teacher educators agreed, disagreed, or strongly disagreed on the didactic abilities required of instructors in ICT-based education.

Figure-3: Distribution of Frequency Percentage of Teacher Educator on Required Didactical ICT Competencies for Teachers (N=100)



Discussion:

The development of the capacity to apply ICT abilities in producing and presenting information has been shown to be the highest ranking item among the technical ICT competencies that teachers need to learn. Technology-related critical ICT skills are presented by Freedman (1999) in four primary knowledge domains, including hardware, software, curriculum, and general knowledge. These essential ICT abilities go beyond simple technical proficiency in things like keyboarding and software package use. They include the capacity to understand when and how to use ICT to address issues. Another conclusion of this research is that instructors need to prioritise the development of three key pedagogical ICT

competencies: setting up an ICT-based learning environment, establishing rich learning environments with the use of ICT, and comprehending how computer technology may improve student learning. This kind of ICT-based education gives students the chance to grow spiritually, morally, socially, and culturally (DfEE and QCA, 1999). It's noteworthy to note that every respondent agreed that educators must have skills in using ICT in the classroom as a didactic tool and for the implementation of cooperative learning methodologies. In order to build dynamic and effective educational techniques and environments, ICT must be used as a didactic instrument.

Conclusion and Recommendations :

1. The world we live in is rapidly changing due to technology. ICT and its effects on education are already having some important social and economic repercussions. A new age in education has begun, necessitating a change in the roles that teachers, students, and the educational system play. If concentrated efforts are not taken to promote ICT education, it would be exceedingly difficult for India to bridge the digital gap in the age of ICT. The development of teachers with the skills necessary for effective instructional use of ICT in education is one of the tactics to be used in this respect. These instructors are referred to as 21st century educators since they will have constructivist teaching methods and technical, pedagogical, didactic, and social skills. The following suggestions are provided to guarantee that teachers' ICT abilities are developed:
 2. All institutions that prepare teachers should require students to take an ICT course. Training for "Computer Literacy" should not be the foundation of teacher preparation; rather, teachers should be prepared to use technology to create, portray, and exchange knowledge in true, real-world situations. According to research, instructors often instruct in the same manner that they were taught (Ball, 1990, Lortie, 1975).
 3. A novel pre-service teacher education model that satisfies our current demand should be created on the basis of research. It should be kept in mind that the model has the capacity to supply those information and skills as well as educate our future educators to confidently impart knowledge and teaching in the classroom using contemporary technology while keeping in mind national and international standards.
 4. In-service and pre-service instructors should have access to the necessary facilities and materials to practice using ICTs in the teaching-learning process. They should be provided with a setting where they may hone their ICT-based skills.
 5. Institutions that train teachers should use an integrated strategy. This method's objective should be to construct a teaching-learning environment in which practitioners can comprehend the nature of the
- forementioned four categories of abilities and apply the appropriate competences that are anticipated and demanded of them.
6. The teacher training programmes should include a course in technology, pedagogy, and didactics that covers both theory and practice.
 7. Schools should have computers and internet connectivity so that both instructors and students have access to ICT.
 8. Professional development programmes (PDP) for teachers should be set up, with a focus on the advancement of ICT-pedagogical abilities.

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