Research Article

Use of ICT in Teaching-Learning Process in Elementary Level Teacher Education Institutions of Odisha

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Abstract

Preparing teachers for the twenty-first century requires the use of Information and Communication Technology (ICT) in Teacher Education Institutions (TEIs). In this context, the present study examines the availability of ICT resources in elementary level teacher education institutions of Odisha. The study focused on the use of ICT in teaching-learning processes i.e. transaction of theory and field-based activities. The study also analyzed the perspectives of student teachers and teacher educators on the use of ICT in the teaching-learning process. The sample of the study consisted of six DIETs selected randomly from thirty DIETs of the State. Six Principals, thirty-six Teacher Educators (TE), and 120 student teachers of 6 elementary level TEIs of Odisha participated in the study as respondents. A descriptive survey method approach was followed for data collection and analysis. The study found that all TEIs have a computer/ICT lab on their premises and they are well connected with the Internet and other digital equipment, but most of the Teacher Educators were not literate on computer knowledge, so they are facing challenges to implement ICT based teaching-learning practices. The poor networks obstruct the smooth use of ICT in the classes in most of the sampled TEIs. Based on findings, the paper presents educational implications.

Keywords: ICT, Elementary level teacher education Institutions, DIET, Teaching-learning process, Teacher Educators, Student– teachers

Introduction

Preparing pre-service teachers with ICT skills and expertise is now considered a critical component of every teacher-education programme to prepare them to meet the educational demands of the twenty-first century. Most teacher preparation programmes now provide ICT expertise and training to ensure that aspiring teachers are well trained to use ICT in their classrooms. (Gülbahar, 2008). In light of the growing importance of ICT in 21st-century teaching-learning skills, it's worth investigating whether ICT is part of the elementary school teachers' toolkit from the start. Some studies have shown that most teachers are hesitant to use ICT in their classrooms because it was not part of their teacher training or their first year of teaching. (Prensky, 2001; Rosenthal, 1999). As a result, when ICT was implemented, teachers found it difficult to adapt to new ways of working. Teacher cognitions take years to form, according to Verloop, Van Driel, and Meijer (2001), so they can't easily be modified. However, ICT has been described as having the ability to encourage creative teaching by offering a variety of resources that can be used to facilitate learning (Almekhlafi & Almeqdadi, 2010), and it has thus become an integral part of elementary

teacher preparation. UNESCO has made incorporating ICT into education a priority in its efforts to ensure justice and access to education. To promote ICT in education, UNESCO takes a systematic and all-encompassing approach. Access to education, equity, quality learning and teaching, teacher professional development, and educational management and governance will all benefit from ICT.

Integration of Information and Communication Technologies (ICTs) in elementary teacher education is a means to support high-quality teaching and learning, involving teacher educators, teachers, student teachers and leaders. It requires how best to explore the uses of ICT for meaningful learning of students. In the present digital world, students must be given opportunities to learn with effective and efficient integration of ICTs in the classroom. Integrating Information and Communication Technologies (ICTs) in education is highly challenging, especially in the teacher education sector. While there are several factors for the successful integration of ICTs in teaching and learning, professional development of teacher educators, strong leadership support, and institutional commitment play a significant role.

As we can understand that nowadays ICT plays an important role in teaching-learning process. The use of ICT in the classroom helps both teachers and students in their teaching-learning process. The use of ICT in teaching motivates students towards learning. ICT helps teachers to transact the classes easily instead of arranging a lot of readymade TLMs. Now a day, most of the elementary teacher training programs around the world have ICT integrated skills in their training component (Yüksel & Kavanoz, 2011). Thus, compared to their predecessors, the elementary level pre-service teachers of today are in a better position to make ICT a part of their teaching-learning process because of the training they have received. The use of ICT in the teaching-learning process is a relatively new phenomenon and it has been the educational researcher's focus. Teachers and administrators face the difficult task of effectively integrating technology into classroom activities. E-learning, e-communication, easy access to knowledge, online student registration, online advertising, reduced burden of holding hardcopy, networking with resourceful people, and other innovations that ICT has brought to the teaching-learning process are just a few of the innovations that ICT has brought to the teaching-learning process. All of these variables, however, increased the likelihood of effective ICT incorporation in the teaching-learning process. If teachers and administrators are to be persuaded of the importance of using ICT in their teaching-learning process and administration, further training of teaching personnel in pedagogical issues and administration training for administrators should be increased.

Need and Justifications

The teaching-learning process has changed in the twenty-first century, and teachers must be able to incorporate ICT tools into their lessons to fulfil today's educational requirements (Kong et al., 2014). As a result, new teachers need to incorporate ICT into their teaching-learning practices as soon as possible. Several types of researches have been undertaken to determine the extent to which pre-service teachers use ICT. The majority of studies find that pre-service teachers use ICT in their lesson delivery far too infrequently. (Al-Ruz & Khasawneh, 2011; Dawson, 2008; Liu, 2012). Ineffective teacher preparation systems have been blamed in several types of researches for the lack of ICT use (Albirini, 2006; Liu, 2012; Scheeler, 2008).

One of the most frequently mentioned limitations of teacher education programmes is that they primarily provide students with ICT information, rather than how to effectively integrate ICT into curriculum material (Oblinger & Obliger, 2005; Wachira & Keengwe, 2011). Teachers' competency levels in using ICT in their teaching-learning activities must be increased by effective preparation (Koh & Frick, 2009). The new generation of elementary pre-service teachers has been dubbed "digital natives," a term that refers to a generation that grew up in the digital age. (Vodanovich, Sundaram & Myers, 2010). Digital natives are also defined as having a high degree of enthusiasm for using information and communication technologies (Junco, 2014). This raises the possibility that they will use ICT in their classrooms more often. However, according to many surveys, the majority of these pre-service teachers use various ICT services widely outside the classroom for personal use and very little in the classroom for teaching-learning activities. The majority of research on pre-service elementary teachers' use of ICT has centred on determining how well teacher training programmes prepare teachers to use ICT in their teaching-learning activities. (Liu, 2012; Murley, Jukes, & Stobaugh, 2013). Effectiveness of ICT i.e. mobile applications have been reported in the monitoring of activities of DIETs of Odisha (Nayak and Behera, 2019)

The use of ICT in the teaching-learning process is to improve teaching-learning and appraisal processes, promoting teacher training and professional development, enhancing educational access and streamlining educational planning, management, and administration, including admissions, attendance, and assessment processes, among others. (NEP, 2020). In the present scenario educational technology, such as resources, techniques, and materials are being used for improving the quality of education. The systematic use of ICT resources is important for the effectiveness of teaching and related activities so that we can achieve better learning outcomes. Apart from the curricular boundaries different universities, colleges, training institutes, different sectors of the job even if in some schools ICT is used preferably and frequently. So, elementary teacher education institutions, such as DIETs, an educational and training institute, must be linked with the use of ICT in the teaching-learning process. Use of ICT may reduce the use of paper in the teaching-learning process. A page of paper may not be visible to all students in a big classroom/more than 100 students in a classroom. But one page in the computer attached with a projector can be visible to all learners in the class. So, the use of ICT can save a lot of money and other resources. Many videos related to subject-based science-related 3-D pictures, innovative, motivated & inspiring videos can be used in the regular classroom. So, every DIET should use ICT in their regular classes and training sessions for better visibility of learners. Using the internet, blogger, Google classroom, zoom meet, etc. in teaching-learning can enhance the learnability within the educational process. Online quiz competitions, assignments and other types of evaluations can be done very easily. So, it is essential to use ICT in the teaching-learning process of different elementary teacher education institutions for enriching ICT knowledge among pre-service student teachers and in-service teachers. The present study attempts to address the issues by investigating the use of ICT in the teaching-learning process in elementary level Teacher Education Institutions (TEIs) of Odisha. The rationale behind this study was to see the ICT used by teacher educators, student teachers and other stakeholders in preparing elementary teachers and

other associated teaching-learning activities. It's critical to determine if ICT is included in this collection of abilities because, as Liu (2012) points out, this framework lays the groundwork for their future teaching-learning practices; if ICT isn't included from the start, it might be difficult to incorporate it later.

Objectives

1. To study the availability of ICT resources in elementary level teacher education institutions of Odisha.
2. To study the use of ICT in the teaching-learning process i.e. transaction of theory and field-based activities.
3. To study the perspectives of the use of ICT by student teachers and teacher educators of elementary level teacher education institutions of Odisha.

Research Questions

1. Whether ICT lab or all the components related to ICT Lab are available in each elementary level teacher education institution i.e. Computer, Laptop, LED TV, Projector, and Internet facility?
2. What are the uses of ICT in elementary level teacher education institutions?
3. How are ICTs used in the teaching-learning process of elementary level teacher education institutions?
4. What are the challenges/problems faced by the student-teachers in the use of ICT in pre-service teacher education programmes?

Methods and Procedure

Research design: The study adopted a descriptive survey research method.

Population: As per the Directorate of TE and SCERT, Odisha (2020) there are 30 District Institute of Education and Training, 04 Block Institute of Education and Training, 31 Government Elementary Teacher Education Institutions (ETEIs), 02 Government Elementary Teacher Education Institutions (SC & ST Development) and 01 Non-Government Aided Secondary Training School managed by Minority Community of the State. The population of the study consisted of all the DIETs in the State of Odisha, including all the Heads of the institutions, pre-service teachers and teacher educators.

Sample: From the population, 6 elementary level teacher education institutions (DIETs) were randomly selected by the researcher. In those institutions, all the Heads of the Institutions were the participants of the study. From each sampled institute twenty pre-service teachers and six teacher educators of the selected institutions were again randomly selected for the study. The details of the sample are presented in Table 1.

Table-1: Details of Sample of the Present Study

Name of the Sample DIETs	No. of Student Teachers	No. of Teacher Educator/ Senior Teacher Educator	No. of Principal
DIET, Kalahandi	20	6	1
DIET, Khordha	20	6	1
DIET, Kendrapada	20	6	1
DIET, Keonjhar	20	6	1

DIET, Sonepur	20	6	1
DIET, Rayagada	20	6	1
Total	120	36	6

Tools: Self-developed questionnaire for student teachers and teacher educators, interview schedule for Principal and observation schedule were used for the present study. Questionnaires consisted of a series of questions (close and open-ended).

Procedure of data collection: The data were collected with the help of a self-developed questionnaire, interview schedule, and observation schedule.

- A structured questionnaire consisting of 16 items was used to collect data from the 2nd year D.El. Ed. Student-teachers relating to the use of ICT for learning purposes.
- Besides that, personal interviews were conducted to elicit candid responses from the Teacher/Sr. Teacher Educators and Principals with the help of the interview schedule.
- With the help of an observation schedule, the researcher observed the use of ICT in some theory classes, practical classes, and some other activities by the students and teacher educators. The availability of equipment of ICT and their maintenance were also observed by the researcher in the ICT lab and classrooms.

Delimitations of the Study

The present study was limited to 6 DIETs in the State of Odisha, India. BIETs and other elementary teacher education institutes have not been covered under the scope of the study. The study was conducted during the session 2018-19.

Data Analysis and Interpretation

The data gathered were analysed by using both quantitative and qualitative analysis techniques.

1. Availability of Resources in Sampled DIETs

Table-2: Number of Resources available in different DIETs

Resources	DIET – A	DIET – B	DIET – C	DIET – D	DIET – E	DIET – F
ICT Lab	1	1	1	1	1	1
Internet	Connected	Connected	Connected	Connected	Connected	Connected
Computer	17	25	25	21	30	24
Laptop	2	4	3	3	4	3
Projector	2	3	2	3	3	2
Sound Box	2	2	1	2	8	2
LED TV	1	1	0	1	2	1
Pen Drive	10	5	3	1	6	8
Printer	6	3	2	4	5	1
Related CDs, DVDs	3	15	1	1	15	1

It becomes clear from table-2 that all DIETs have a computer/ICT lab on their premises. All DIETs are also connected to the Internet. All institutes also have computers, laptops, projectors, etc. Some DIETs have less no. of pen drives and CD/DVDs. One DIET has no LED TVs.

2. Use of ICT in DIETs for different activities

Table-3: Use of different types of ICT Resources (in %)

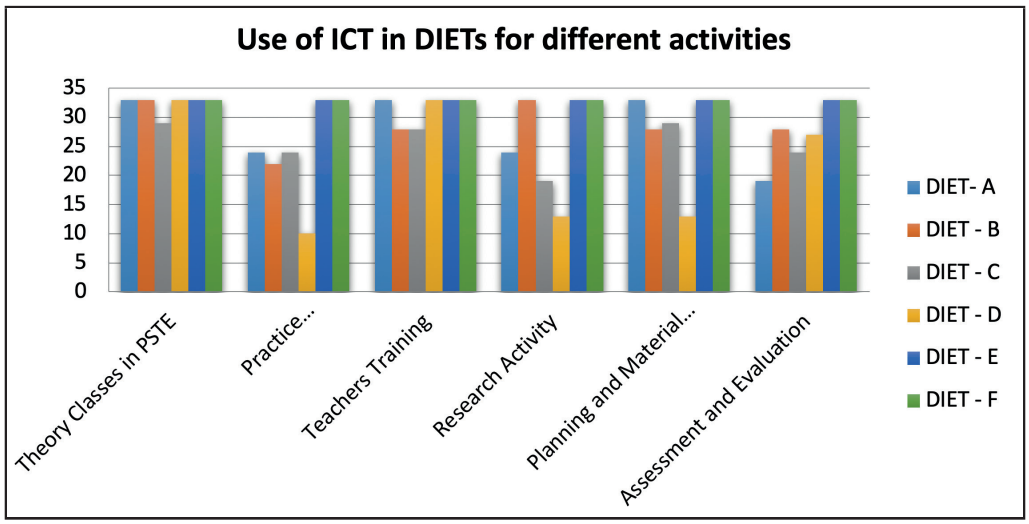
Uses of ICT	DIETs	I	II	III	IV	V	VI	VII	VIII	IX	Avg. % of use of resources
Theory classes in PSTE	A	57	29	71	71	29	0	43	29	14	38
	B	14	14	29	29	14	0	14	0	29	16
	C	0	29	57	71	71	0	71	43	14	40
	D	0	90	90	90	20	0	90	50	10	49
	E	100	100	100	100	100	0	100	50	50	78
	F	0	0	0	0	50	50	0	0	0	11
Practice teaching/ Internship	A	29	29	29	43	29	0	14	29	0	22
	B	0	14	29	14	0	0	0	0	0	6
	C	14	14	43	14	0	0	14	14	43	17
	D	0	70	80	60	0	0	90	50	0	39
	E	0	0	100	0	0	0	0	100	100	33
	F	0	0	50	0	50	0	0	0	0	11
Teachers training / ISTE	A	43	43	57	57	43	14	43	29	14	38
	B	29	0	14	14	0	0	14	0	14	9
	C	14	14	86	71	57	0	71	43	71	47
	D	60	90	90	90	50	0	90	70	10	61
	E	100	100	100	100	100	100	100	100	100	100
	F	0	0	0	50	0	50	0	0	0	11
Research Activity	A	29	43	57	14	14	14	43	29	14	29
	B	0	14	14	14	14	0	0	0	0	6
	C	14	43	57	43	14	0	57	43	43	35
	D	10	80	90	30	20	10	90	70	10	46
	E	100	100	100	50	0	0	100	100	0	61
	F	0	0	0	50	0	50	0	0	0	11
Planning & Material development	A	57	43	29	43	43	14	29	29	14	33
	B	0	14	0	0	0	0	14	14	14	6
	C	29	57	71	43	29	0	29	57	86	45
	D	20	90	90	20	20	20	80	80	20	49
	E	100	100	100	100	100	100	100	100	50	94
	F	0	0	0	0	0	50	50	0	0	11

Assessment/ Evaluation	A	43	43	57	29	29	14	14	14	14	29
	B	0	29	29	14	14	0	14	14	0	13
	C	43	71	29	0	14	14	0	43	57	30
	D	60	80	80	20	10	10	80	80	10	48
	E	100	100	100	100	100	100	100	100	100	100
	F	0	0	50	0	50	0	0	0	0	11

N.B: I-ICT Lab, II-Computer, III-Laptop, IV-Projector, V-Sound Box, VI –LED TV, VII-Pen Drive, VIII-Printer, IX-CDs/DVDs

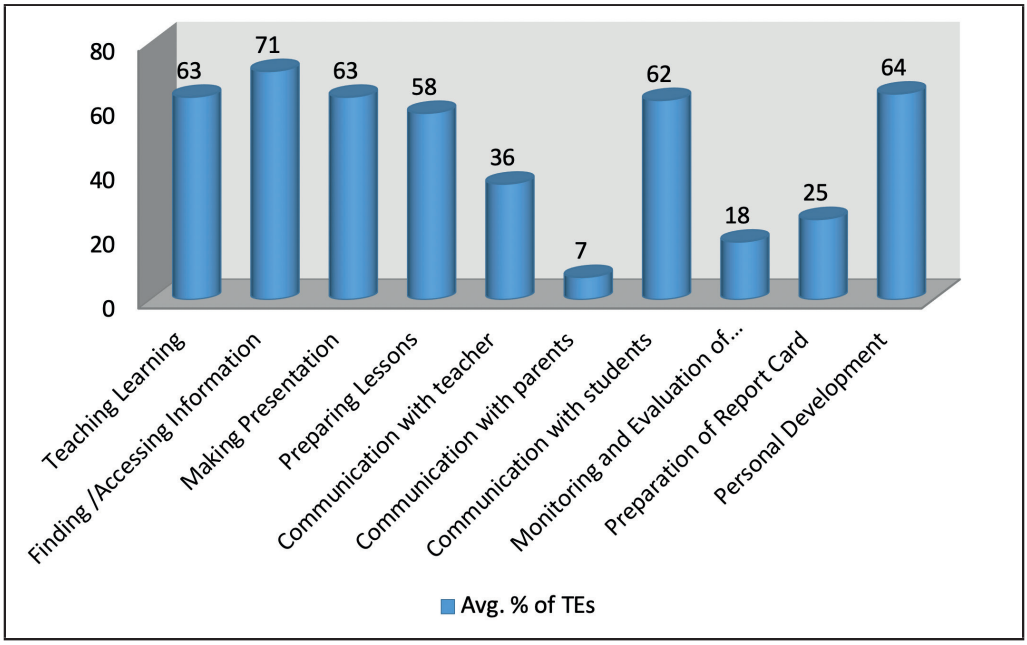
From table-3, it has been reflected that in almost all institutes' TEs are using LED TV very few times for any types of activities in DIETs. They are mostly feeling comfortable with the resources like a projector, laptop, and soundbox. Out of six sample DIETs; one DIET has used almost all resources in each activity.

Figure-1: Use of ICT in DIETs for different activities



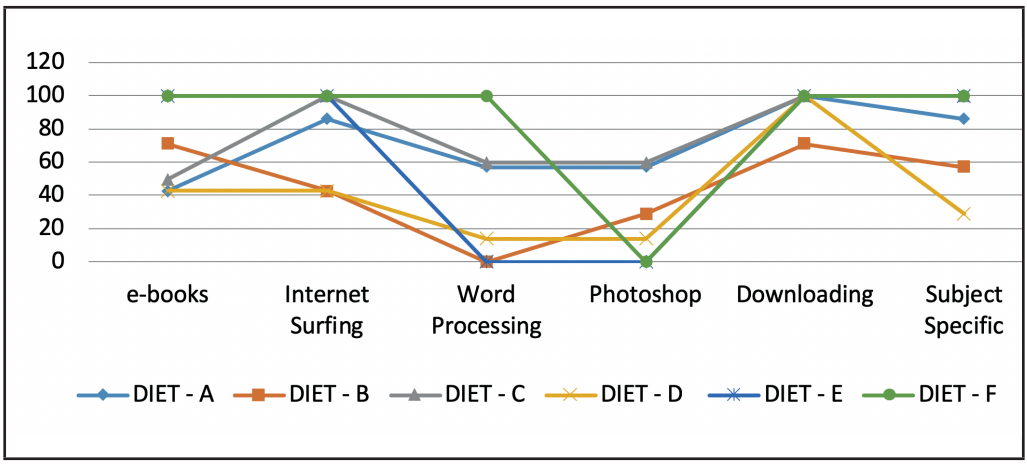
From the data given in figure 1, it has been reflected that most of the TEs are using ICT in their theory classes and teachers' training. Teacher Educators from two of DIETs out of six sample DIETs are using ICT in most of the sectors compared to that other of DIETs. But it is observed that in practice teaching and research activity, the use of ICT is very lesser than that of other activities.

Figure-2: Average Percentage of TEs using ICT in Teaching and beyond the Teaching- Learning Process



From figure 2, it has been reflected that the highest percentage of TEs from different DIETs is using ICT in Finding/ Accessing Information, while the lowest use of ICT in case of communication with parents. Two DIETs are using ICT most of the time in different aspects compared to other DIETs. But on average, most of the TEs are using ICT in the case of finding/accessing information, personal development, teaching-learning, making presentations, communication with students and preparing lessons. It is observed that the use of ICT in the monitoring and evaluation of students' performance and preparing report cards is minimal.

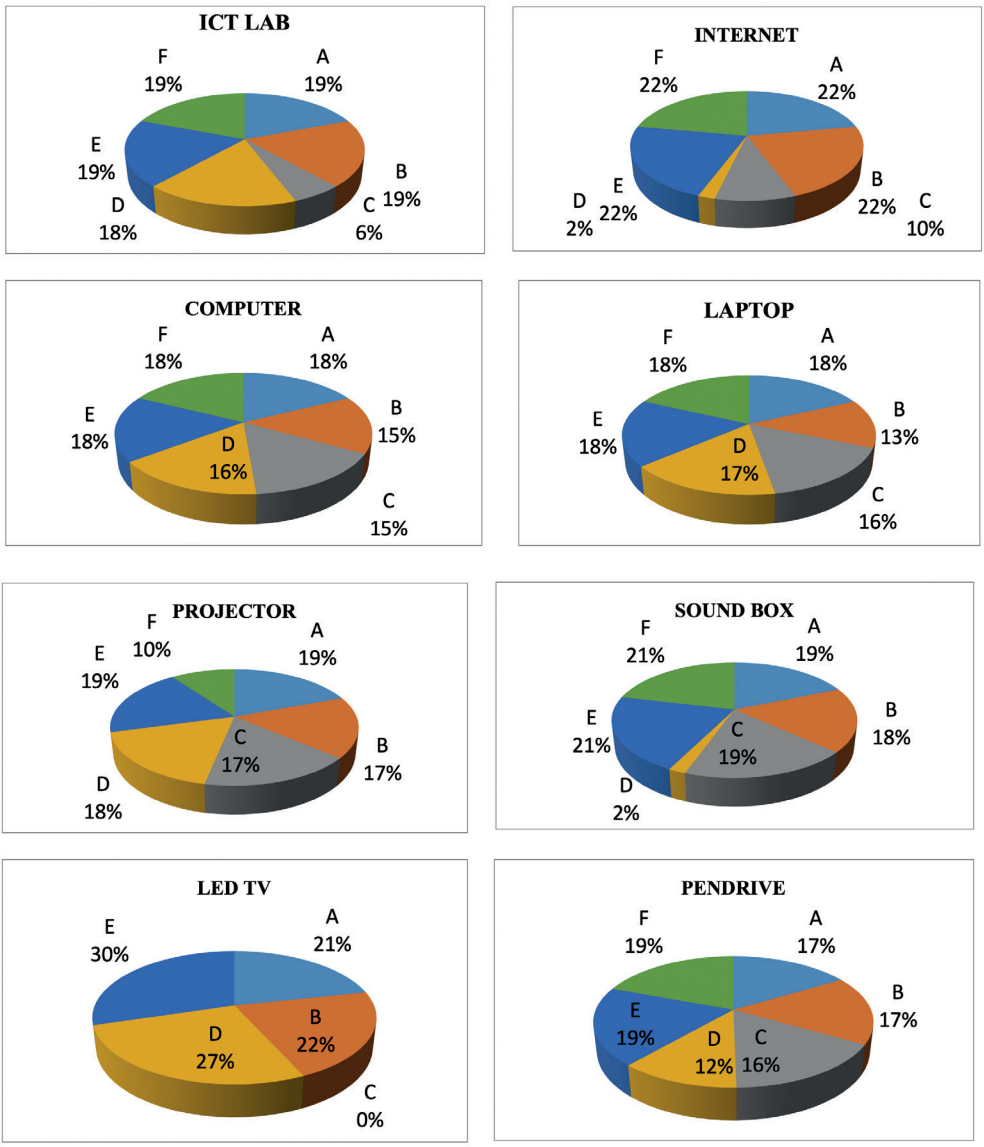
Figure-3: Use of ICT by Teacher Educators in Teaching – Learning Process

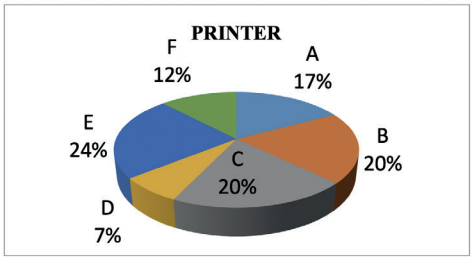


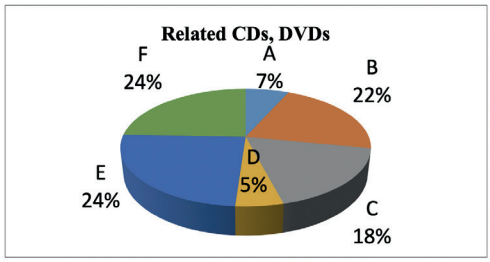
From figure 3, it has been reflected that almost all TEs are using technology for Downloading, Internet Surfing, and Subject-Specific purposes very often. Most of the TEs are lacking the use of Word Processing and Photoshop. Among all DIETs, one DIET's TEs are using technology in the above cases very few times. Two DIETs are using ICT frequently.

3. Maintenance of ICT resources

Figure-4: Maintenance of ICT Resources



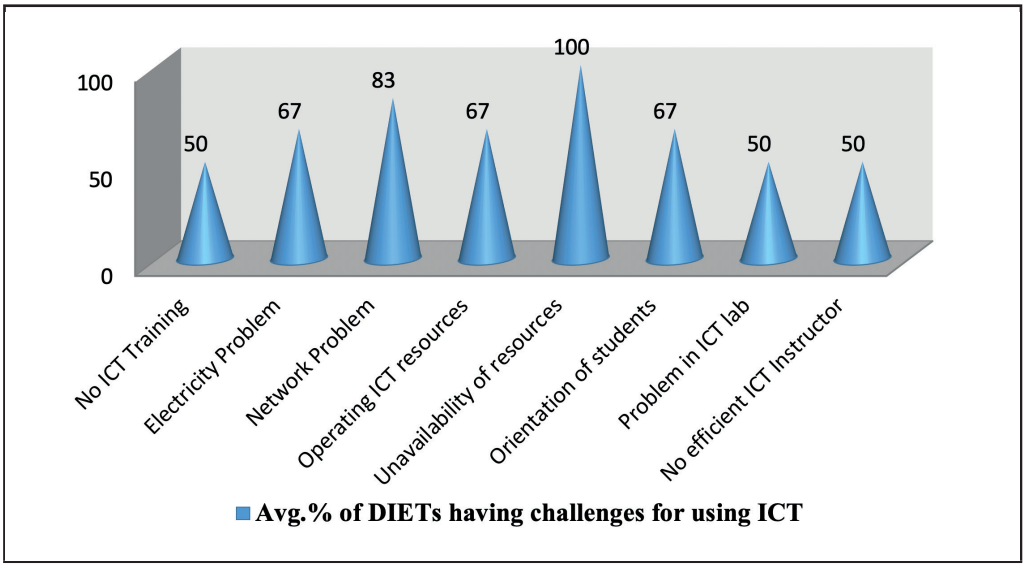




From figure 4, one DIET (C) needs to keep more focus on the development of ICT labs. Internet facility is very low in DIET (D), which is situated in hilly and forest areas. Almost all DIETs have proper maintenance of Computers, but there is a lack of adequate laptops. Maintenance of projectors, soundbox, LED TV, Printers, and Pen drive is in average condition. All the sampled DIETs do not have sufficient and well CDs/DVDs resources.

4. Challenges Faced by The Principals, Teacher Educators and Student-Teachers in Use of ICT

Figure-5: Challenges Faced by the Principals, Teacher Educators, and Student-Teachers



From figure 5, it is clear that the students – teachers, teacher educators and Principals of different DIETs are facing challenges for the use of ICT in teaching–learning process. 1) Most of the TEs have inadequate computer knowledge because of a lack of basic Computer training. 2) There are some DIETs where regular power cuts happen. Inverters/ batteries are there only for Computer Lab, not for all the classrooms. 3) Availability of the internet is a problem in two DIETs. 4) Use of ICT resources is a challenge for a TE in the class for completing the session in time due to inadequate training. 5) Computer labs of some DIETs are not up to date with recent resources.

Major Findings

The major findings of this research are described below:

- Approximately (90–95) percent of teacher educators (TEs) are using ICT in their theory classes and in teachers' training programs to make the process more effective.
- Resources like Projector, Laptop, and Soundbox are mostly used by almost all institutes' TEs. The Use of LED TV was very less.
- The majority of teacher educators (TEs) from different DIETs are using ICT in Finding/Accessing Information, while the lowest in use of ICT in the case of Communication with parents. But on average, most of the TEs are using ICT in the case of finding/accessing Information, personal Development, Teaching-Learning, Making presentations, Communication with students and Preparing Lessons.
- It is observed that the use of ICT in the monitoring and evaluation of students' performance and preparing report cards is not very satisfactory.
- The majority (95 percent) of TEs are using technology for Downloading, 79 percent using Internet Surfing and Subject-Specific purpose. All DIETs have a computer/ICT lab, Computers, Laptops, Projectors, etc. Some DIETs have less no. of Hard Discs like Pen drives, and CD/DVDs. In most of the sampled DIETs, there is a problem with high-speed internet connection.
- In one of the sampled DIETs, ICT Lab is not in good condition and the internet facility is very low. Almost all DIETs have proper maintenance of computers, but inadequate laptops. Maintenance of projectors, soundbox, LED TV, printers, and pen drive is in average condition. These are also challenges in the adequate use of ICT in the teaching- learning process.
- Some DIETs are having regular electric power cuts. Inverters/ batteries are available only for computer labs, but these are not available for all the classrooms. Frequent network problems occur in most of the DIETs.
- As all TEs have no basic computer knowledge, operating/ connecting ICT resources is a challenge for a TE in the class, by which a TE can't complete the session in time.
- There are also not sufficient resources which are required in ICT based teaching–learning process in some DIETs, which creates many problems for successful completion of a class.
- Some DIETs have no ICT instructors and some have ICT instructors. Teacher educators and ICT instructors have inadequate training on ICT use and integration. Inadequate training is a challenge for the smooth operation of ICT resources.

Discussion

The first objective was to study the availability of ICT resources in DIETs of Odisha. It was framed to know if the actual resources related to ICT are available in DIETs or not. This is also found that all DIETs have a Computer/ ICT Lab on their premises. All DIETs have arranged the internet connections with the computer(s), according to their availability. Internet connection problems occur in many of the DIETs. This may be due to the different geographical environments, unavailability of all the required instruments/materials related to network connection and irregularity

of electricity supply. All DIETs have computers, laptops, projectors, LED TV, Soundbox, etc. The number of resources are not the same in all sample DIETs. Some DIETs have fewer Hard Discs, Pen drives, and CD/DVDs. The numbers may be due to less knowledge of the staff (teaching and non-teaching) or Principals about the proper use of ICT resources. Further, it is noticed that maintenance of Lab is not done equally in all DIETs. Maintenance of all the above-mentioned resources is in average condition.

The second objective was to study the use of ICT in teaching-learning process i.e. transaction of theory and field-based activities. It was framed to know how the teacher educators implemented the technological knowledge in their theory and practical classes. This is also found that most of the TEs are using ICT in their theory classes, in different curricular and co-curricular competitions, research activities, and in-service teacher's training programmes which is contradictory with the previous research findings of Albirini (2006); Liu (2012); and Scheeler (2008). Most of the Science TEs are using ICT in their classes. Most of the TEs are using Projectors, Laptops, and Soundbox. They mainly use PowerPoint presentations for their teaching-learning process. But their use of LED TV is very negligible. This may be due to some DIETs focusing on more use ICT, whereas others are not so serious about the use of ICT in their institutions which is supported by the previous studies of Al-Ruz & Khasawneh (2011); Dawson (2008) and Liu (2012). It is observed that the use of ICT in the Monitoring and Evaluation of students' performance and preparing report cards is not very satisfactory. Most of the TEs use ICT for internet surfing and downloading. Out of the sample DIETs, teacher educators of two DIETs are using ICT frequently. This may be due to a lack of coverage of training and orientation for all TEs. All the TEs of the DIETs in Odisha have not taken the training for computer literacy (Computer literacy TEs are very low). The TE & SCERT also has initiated to give training on ICT integration to TEs. This will have an impact on quality teacher preparation at the elementary level. A mobile application is designed by TE & SCERT to monitor the progress of different activities of DIETs. This will be helpful for the quality improvement of pre-service teacher education programmes. Further, it is observed that one sample DIET uses ICT for teaching-learning, in different curricular and co-curricular competitions, in-service training programmes most of the time compared to other sample DIETs. The innovation may be used by other DIETs of the State.

The third objective was to study the perspectives of the use of ICT as per the views of student teachers and teacher educators. It was framed to know the challenges faced by the student-teachers and teacher educators. It is found that there are some DIETs where regular power cuts happen. Inverter/ batteries are there only for Computer labs and these are inadequate for all the classrooms. High-speed internet is not available and frequent network problems occur in most of the DIETs. This may be due to the irregular electricity supply and different geographical areas. Operating/connecting of ICT resources is a challenge for a TE in the class, which a TE can't complete the session in time, this may be due to all TEs are not aware of the basic computer knowledge as studied earlier by Oblinger & Obliger (2005) and Wachira & Keengwe (2011). There are also not sufficient resources which are required in teaching–learning process in some DIETs, which creates many problems for a successful transaction of class. The Computer Lab of some DIETs is not up to date. Further, it is evident that some

DIETs have no ICT instructors which creates a big challenge for smoothly operating ICT resources; this reflects in earlier research of Liu (2012) and Murley, Jukes, & Stobaugh (2013). All these problems are happening due to the less knowledge or no knowledge of the head or staff of the institutions about the use and maintenance of ICT resources supported in previous studies by Albirini (2006), Liu (2012) and Scheeler(2008).

Implications and Conclusion

The NEP (2020) envisions quality education by the integration of technology in the teaching-learning process of school education and teacher education. The study was conducted to find out the uses of ICT in the teaching-learning process of elementary level teacher education institutions in the State of Odisha. Based on the findings, the paper suggested certain implications which will have an impact on the Student-Teachers, Teacher Educators, Principals, and the State for designing a better curricular environment in TEIs.

The TE and SCERT, Odisha has taken initiatives for establishing and enabling the environment to promote the usage of ICT especially in Higher Secondary and Secondary govt./aided schools in rural areas and enrichment of existing curriculum and pedagogy by employing ICT tools for teaching and learning (http://scertodisha.nic.in/ict-initiative-in-teachers-education/). More ICT resources need to be provided to all elementary teacher education institutions. As all Teacher Educators have not been oriented with ICT, so accordingly a plan may be designed. Refresher training on ICT may be planned. Curriculum Planners may design the syllabus for students–teachers of DIETs on ICT.

Teacher Educators may be inspired by the Teacher Educators of other DIETs who are using ICT in their regular classes innovatively. They may try to enhance their capacity on ICT. Teacher educators can exchange thoughts on the use of ICT from one another to enhance the use of ICT.

They may take interest in giving an orientation on computer knowledge to their student teachers. More effort needs to be made by teacher educators and student teachers in the integration of ICT for assessment, field-based activities apart from monitoring and governance by the State. The TE & SCERT has also begun to provide TEs with training on ICT integration. This will affect on the standard of elementary teacher training. The TE & SCERT have created a mobile application to monitor the progress of DIET activities. This would continue to increase the efficiency of the pre-service teacher education programme in the State.

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