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Research Article

Perception Of Diet Student Teachers Towards ICT-Based Classroom

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ABSTRACT

National Education Policy 2020 envisions a comprehensive strategy for integrating Information and Communication Technology (ICT) into the teaching-learning process, aiming to prepare students for 21st-century challenges through the transformative power of technology in education. Recognising the importance of Information and Communication Technology (ICT), this study examines student teachers' perceptions at the District Institute of Education and Training (DIET) in Odisha regarding the integration of ICT in classrooms. Employing a mixed-methods approach, the research utilises data gathered from student teachers of five DIETs, investigating their beliefs, experiences, and perceptions related to the use of ICT tools in educational settings. The study focuses on the essential use of ICT, the perception of ICT in the teaching-learning process, the benefits and barriers of integrating ICT, the extent of ICT training during teacher education programs, and the overall readiness of student teachers to incorporate technology into their teaching practices. According to the study's findings, students used ICT more than any other application to communicate with peers through inquiry-based and collaborative learning. The ANOVA test reveals that the relationship between educational qualification and certain statements regarding the advantages of ICT tools in classroom learning, the potential benefits of ICT tools, and the barriers to their adoption is significant at the 0.05 level of significance. The t-test results for rural and urban students' perceptions depict that student teachers from both rural and urban areas require additional training and orientation on data collection and the utilization of ICT. Therefore, it is highly essential to provide training to student-teacher educators in various educational programs to change the perception of integrating ICT into the teaching-learning process.

Keywords: Perception, DIET, Student Teacher, ICT, Classroom

Introduction

One of the most significant aspects of the twenty-first century is the rapid pace of social, economic, and technological change. Technology, particularly ICT (Information and Communication Technology), is bringing people closer together and erasing the barriers that previously separated them. ICT refers to the integration of technologies used for accessing, gathering, manipulating, and presenting or communicating information. (Goel and Gupta, 2012). As a result, civilizations are being exposed to new ideas and perspectives at a rate never seen before, which is changing them and making it harder for them to survive and adapt. According to Siatras and Panagiotis (2013), a key factor in removing societal barriers to a democratic and compassionate society is universal access to scientific knowledge. However, only the privileged class has access to high-quality education in developing nations, which has significantly widened the divide between the rich and the poor. As a result, this has impeded national development overall (Siatras & Panagiotis, 2013; Tabira & Otieno, 2017).
Education is one of the critical sectors where ICT has been used extensively during and after the COVID-19 pandemic. It can equalize the differences in schooling between boys and girls. The teaching and learning process has changed from a traditional classroom model to a virtual-based model. The integration of ICTs in teacher training has been a challenging task (Larose et al., 1999), and it has increased pressure on educational systems to utilize them optimally (Ololube, 2006). ICT and its relevant tools must be adopted and adapted to

realize this potential, enhance the instructional design, and achieve the intended learning outcomes (Tay, 2016). ICT tools that support students' diverse learning needs, social contexts, and gender differences, which affect students' learning engagement and outcomes, should be utilized in ICT-enabled learning (Dorji et al., 2015). When used with deliberate attention to gender, ICT-enabled learning has the potential to improve educational fairness and inclusivity. According to Nusir et al. (2013), the incorporation of computer-assisted multimedia into educational texts and images enhances students' ability to interact and pay attention, ultimately leading to a deeper understanding of fundamental subject matter.

According to the National Curriculum Framework for Teacher Education (NCFTE), 2009, it has been reported that ICT can be utilized to enhance professional development and provide academic support to teachers. The Justice Verma Commission (2012) recommended that ICT be utilized and materials developed in a decentralized and contextualized manner, with the participation of teachers and teacher educators, for more sustained benefits. The importance of integrating ICT is justified by its capacity to improve cognitive and logical capacities. Several studies, initiatives, and investments have been made to integrate Information and Communication Technology (ICT) into education from this perspective (Cattagni & Farris, 2001; Ficklen & Muscara, 2001). Positive learning outcomes have been linked to the use of ICT in schools, as indicated by several studies (Sivin-Kachala, 1998; Holmes et al., 2000). There is also the importance of ICT in professional courses. Student teachers of different professional courses can integrate the concept of ICT into their learning process. They can also utilize these ideas when delivering lessons in practice schools and apply them in developing teaching-learning materials, e-resources, and test items. Based on these ideas, the researcher attempted to assess the teachers' perception of the use of ICT in the teaching-learning process.

To utilize ICT tools effectively, it is essential to understand the perception of student teachers and educators towards ICT. According to Vanan (2020), the research paper states that ICT methods make complex topics easier for teacher educators and also reduce the stress of teachers. Furthermore, in his study, 64% of the teacher-educators have a high attitude towards the ICT method. Novita Eka Tristiana and Elvira Rosyida MR (2018) indicated that students have a positive attitude toward the integration of ICT in the classroom, as it provides numerous benefits for them in gaining knowledge in the TEFL methodology class. The students are more comfortable when asking questions, sharing information and ideas with their peers, and seeking help to communicate effectively in ICT. H. Halim and N. Sulaiman (2020) found, based on the research outcome, that a positive correlation exists between the perception of multimedia e-learning and its enhancement of academic performance. However, the perception of student teachers towards ICT is also influenced by the availability of infrastructure, mentorship, opportunities, and overall attitude towards ICT, as indicated by Andoh (2019). It is also noticed that some teacher educators hesitate or fear using ICT tools and techniques in their teaching and learning process, possibly due to multiple factors, such as the availability of skilled teachers and ICT resources. Aslan and Zhu (2016) suggested in their study that both pre-service teachers and new teachers need additional training to develop proficiency in utilizing ICT in education.

Research Questions:

1. What is the extent of familiarity and utilization of Information and Communication Technology (ICT) tools among DIET student teachers?
2. What are the perceptions of student teachers of DIETs towards ICT-based classroom situations?
3. What are the challenges and barriers to using technology in the classroom?

Objectives of the study

1. To assess the current level of familiarity and usage of Information and Communication Technology (ICT) tools among DIET student teachers.
2. To determine the perceptions of student teachers regarding the potential benefits of ICT-based learning.
3. To identify the challenges and barriers to the effective use of technology in the classroom.

Methodology

The current study is a descriptive survey-type research project aimed at collecting detailed descriptions of the perceptions of DIET student teachers in Odisha. The sample consisted of Five District Institutes of Education and Training (DIETs) in Odisha, which were selected randomly. In each DIET, 100 students enrolled in the first year. There are currently no second-year students in all the DIETs of Odisha. Therefore, all first-year students from five selected sample schools (Bhadrak, Jajpur, Keonjhar, Khordha, and Sonepur) are taken as the sample for the study. The online Google form survey questionnaire was sent to all the student teachers of the respective DIET through their official WhatsApp group. The online survey, conducted using Google Forms, was completed by 228 student teachers from the sampled DIETs. The researcher used the questionnaire developed by Thomas (Thomas, 2014). The researcher modified some items in the questionnaire and used them. The tool used in the present study has six sections. The first section belongs to the demographic characteristics of the student teachers. The second section belongs to the basic ideas on the use of ICT. This section contains 27 items, and the responses are collected from the student teachers using a 5-point Likert scale, ranging from 1 (‘not at all’) to 5 (‘always’). The third section pertains to the use of ICT for learning purposes, comprising 13 items, and the scale is similar to the one above. The fourth section pertains to the

perception of student teachers towards ICT-based learning. In this section, there are 24 items, all of which are on a 5-point Likert scale, ranging from 1 ('Strongly Disagree') to 5 ('Strongly Agree'). Both the fifth and sixth sections address the benefits of ICT and the barriers to ICT, respectively. The scale of these two sections is comparable to that of the fourth section. The tool consisted of a series of close-ended items. The qualitative analysis was conducted by processing the data through SPSS, which included ANOVA and t-tests.

Analysis of Data

The primary objective of this study is to evaluate student teachers' perceptions of ICT-enabled classrooms. The study identifies and reports on the utilization of ICT-based tools in the teaching and learning process, as well as the barriers they encountered during this process.

In the present study, 228 responses were collected from student teachers of five different DIETs in Odisha. All the data were collected and transferred into MS Excel and then coded according to the needs of the SPSS software. The data were then analyzed using SPSS software and reported. The sampling adequacy was established through KMP and Bartlett's Test, which was significant at p = 0.000 (Table 1).

Table 1: Sampling adequacy test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.925
Bartlett's Test of Sphericity	Approx. Chi-Square	16934.795
	Df	3160
	Sig.	.000

The questionnaire's reliability was assessed for a sample of 228 student teachers using Cronbach's Alpha method before and after deleting individual scores. Table 2 presents the results obtained. The validity of the questionnaire was established through internal consistency. The correlation coefficient was calculated between each questionnaire item's degree and the overall score to which it belongs. The correlation coefficient values ranged from 0.59 to 0.86. The correlation coefficients are statistically significant at the 0.01 level, and the internal consistency did not necessitate the removal of any items.

Table 2: Reliability statistics of the questionnaire

Reliability Statistics	
Cronbach's Alpha	No of Items
.969	80

The demographic features of the sample are presented in Table -3. The table indicates that female participants (66.67%) outnumber male participants (33.3%). The majority of students (59.65%) enrolled in this professional course after completing their graduation degree. All students are enrolled in first-year courses, as there was no admission process for students during the previous year. Students in the arts category responded highly to this survey.

Table 3: Demographic characteristics of the sample

Items	**Frequency**	**Percentage**
Gender		
Male	76	33.33
Female	152	66.67
Areas belong to		
Urban	46	20.18
Rural	182	79.82
Educational Qualification		
12^{th}	83	36.40
B.Tech	01	0.44
Graduation	136	59.65
Post Graduate	08	3.51
Stream		
Arts	111	48.68
Science	107	46.93
Commerce	08	3.51
Others	02	0.88
Caste		
General	40	17.54
SEBC	104	45.61
SC	34	14.91
ST	33	14.47
OBC	17	7.46

The student teacher's perception of the essential use of ICT is presented in Table -4. The table indicates that most student teachers (42.1%) use email services regularly for various purposes, followed by the use of different educational apps (39.5%) and laptops or computers (37.7%). Student teachers also reported that they had not used Wikis (42.1%), Simulation tools (41.2%), Virtual labs (41.2%), or OER depositors (39.5%). The table also indicates that student teachers utilized important aspects of ICT tools, including spreadsheet applications (34.6%), presentation applications (31.6%), word processing applications (31.1%), graphics applications (28.1%), tablets (27.2%), and the internet (26.3%), to some extent. They do not use this software or apps regularly. This may be due to the student's lack of ICT skills. These results indicate that student teachers have a mixed understanding of the use of ICT tools. Although they are working in different social networks and OER repositories, it is not satisfactory. They need more orientation or awareness on the use of these tools in the teaching-learning process. ICT-based resources must be provided to student teachers on the proper use of ICT for learning purposes.

Table 4: Perception of student teachers towards Basic Use of Information and Communication Technology

Items	Frequency					Percentage				
	NA	R	S	VO	A	NA	R	S	VO	A
Presentation applications	22	37	72	18	79	9.6	16.2	31.6	7.9	34.6
Word processing applications	28	36	71	21	72	12.3	15.8	31.1	9.2	31.6
Spreadsheet applications	34	33	79	25	57	14.9	14.5	34.6	11.0	25.0
Graphics applications	54	48	64	21	41	23.7	21.1	28.1	9.2	18.0
Multimedia applications	58	52	45	25	48	25.4	22.8	19.7	11.0	21.1
WWW use (Internet)	25	40	60	22	81	11.0	17.5	26.3	9.6	35.5
E-mail Services	29	35	38	30	96	12.7	15.4	16.7	13.2	42.1
Smartboard	21	38	55	26	88	9.2	16.7	24.1	11.4	38.6
Laptops/Computers	29	39	46	28	86	12.7	17.1	20.2	12.3	37.7
Tablets	49	37	62	30	50	21.5	16.2	27.2	13.2	21.9
Projectors	66	33	42	31	56	28.9	14.5	18.4	13.6	24.6
Educational Apps	37	33	43	25	90	16.2	14.5	18.9	11.0	39.5
Conferencing Tools	25	27	56	42	78	11.0	11.8	24.6	18.4	34.2
Social Networks	54	29	49	27	69	23.7	12.7	21.5	11.8	30.3
Search Engines	40	35	49	32	72	17.5	15.4	21.5	14.0	31.6
Web search applications	42	38	45	25	78	18.4	16.7	19.7	11.0	34.2
Audio Books	40	37	53	35	63	17.5	16.2	23.2	15.4	27.6
Blogs and Blogging Tools	71	52	48	21	36	31.1	22.8	21.1	9.2	15.8
Simulation Tools	94	36	47	19	32	41.2	15.8	20.6	8.3	14.0
Wikis	96	43	32	24	33	42.1	18.9	14.0	10.5	14.5
Google App Store	70	31	35	32	60	30.7	13.6	15.4	14.0	26.3
AI Tools	39	35	49	29	76	17.1	15.4	21.5	12.7	33.3
Chat-Gpt	78	40	39	27	44	34.2	17.5	17.1	11.8	19.3
OER Depositors	90	37	39	23	39	39.5	16.2	17.1	10.1	17.1
Virtual labs	94	39	40	24	31	41.2	17.1	17.5	10.5	13.6
Video lectures	77	38	40	21	52	33.8	16.7	17.5	9.2	22.8
Discussion forums	49	36	42	29	72	21.5	15.8	18.4	12.7	31.6

In the teaching and learning process, the use of ICT tools holds significant importance. Both teachers and student teachers benefit from the use of different learning apps in the learning process. The student teacher's perception of the use of ICT tools has been mentioned in Table 5. To communicate information using ICT tools, 99 students responded that they preferred this method. They also employed various tools for data collection, and 43% of student teachers performed this work regularly. Only 38.6% of student teachers create visual displays of data or information, which is always followed by a presentation purpose (37.7%). 31.1% of student teachers occasionally adopted visual presentations. Thirty-seven students do not read any mail or send mail to others, while 35 students do not prefer to create models or simulations for their learning purposes.

Table 5: Perception of student teachers towards the use of ICT tools in Learning Purpose

Items	Frequency					Percentage				
	NA	R	S	VO	A	NA	R	S	VO	A
To organize and store information	38	38	46	20	86	16.7	16.7	20.2	8.8	37.7
To collect data	18	29	57	26	98	7.9	12.7	25.0	11.4	43.0
To communicate information	13	24	68	24	99	5.7	10.5	29.8	10.5	43.4
To create visual displays of data/information (e.g., graphs, charts, maps)	19	25	68	28	88	8.3	11.0	29.8	12.3	38.6
To create visual presentations	20	35	71	27	75	8.8	15.4	31.1	11.8	32.9
To create e-resources (Videos, Infographics, Audio, Maps, concept maps, etc.)	23	29	70	28	78	10.1	12.7	30.7	12.3	34.2
To create models or simulations	35	31	61	33	68	15.4	13.6	26.8	14.5	29.8
To read and send E-mail	37	35	54	32	70	16.2	15.4	23.7	14.0	30.7
For presentation purposes	14	29	61	38	86	6.1	12.7	26.8	16.7	37.7
To Work on a database/spreadsheet	26	31	58	39	74	11.4	13.6	25.4	17.1	32.5
To share e-Resources	33	35	61	31	68	14.5	15.4	26.8	13.6	29.8
Downloading e-Resources	31	34	56	35	72	13.6	14.9	24.6	15.4	31.6
Uploading e-Resources	24	35	57	36	76	10.5	15.4	25.0	15.8	33.3

The student teacher's perception of the advantages of ICT tools is presented in Table 6. The table indicates that ICT tools help enhance self-learning and construct knowledge. Understanding complex concepts is made easier due to the integration of ICT, according to the opinion of student teachers (46.9%). Forty students remain silent on the influence of ICT on the practice teaching of student teachers. Upon reducing the workload of the student teachers, 40 students also remain silent. In response to the statement "ICT is useful in the practice teaching of student teachers," 16.2% of student teachers expressed their disagreement with it. Similarly, 26 students disagreed with the response "the use of ICT may distract student teachers from the main objectives," while 87 students agreed with it. One hundred six students informed that ICT should be used for assessment purposes. Similarly, 100 students reported inculcating ICT skills into the teaching-learning process.

Table 6: Student teachers' perceptions of the advantages of ICT tools in classroom-based learning.

Items	Frequency					Percentage				M	Std
	SD	D	N	A	SA	SD	D	N	A	SA		
It helps in accessing, organizing, and displaying data	29	27	33	53	86	12.7	11.8	14.5	23.2	37.7	3.6	1.4
It provides lots of information and data	7	5	20	102	94	3.1	2.2	8.8	44.7	41.2	4.1	0.91
It encourages revision and better communication	5	8	24	91	100	2.2	3.5	10.5	39.9	43.9	4.1	0.91
The use of ICT tools can stimulate logical thinking	6	13	29	105	75	2.6	5.7	12.7	46.1	32.9	4	0.96
ICT tools make the learning process more interesting and exciting	6	9	39	82	92	2.6	3.9	17.1	36.0	40.4	4.07	0.98
It helps us in self-learning and constructing our knowledge	8	6	18	95	101	3.5	2.6	7.9	41.7	44.3	4.2	0.95
It helps in delivering ideas and conclusions differently	7	7	36	93	85	3.1	3.1	15.8	40.8	37.3	4.0	0.96
It helps in improved understanding of difficult-to-grasp concepts	4	11	32	95	86	1.8	4.8	14.0	41.7	37.7	4.08	0.92
It helps us to learn topics beyond our curriculum	6	9	30	101	82	2.6	3.9	13.2	44.3	36.0	4.07	0.94
ICT can enhance the learning experience	4	12	25	103	84	1.8	5.3	11.0	45.2	36.8	4.1	0.91
The ICT-based approach has improved your understanding of complex concepts	5	7	27	107	82	2.2	3.1	11.8	46.9	36.0	4.1	0.8
ICT-based classrooms are more engaging than traditional classrooms	6	14	26	94	88	2.6	6.1	11.4	41.2	38.6	4.07	0.98
The use of ICT attracts the attention of student teachers	7	8	33	87	93	3.1	3.5	14.5	38.2	40.8	3.8	1.09

The use of ICT may distract student teachers from their primary objectives.	8	26	37	87	70	3.5	11.4	16.2	38.2	30.7	3.6	1.2
ICT is valid in the practice teaching of student teachers.	17	26	40	79	66	7.5	11.4	17.5	34.6	28.9	4.06	0.9
ICT skills are required to practice in the teaching-learning process	7	9	29	100	83	3.1	3.9	12.7	43.9	36.4	4.07	0.9
ICT enhances the quality of teacher education programs.	7	2	38	102	79	3.1	0.9	16.7	44.7	34.6	4.04	0.9
ICT can be used for assessing student teachers.	4	12	30	106	76	1.8	5.3	13.2	46.5	33.3	4.03	0.95
Hands-on experience improves the ICT skills of student teachers	6	11	31	101	79	2.6	4.8	13.6	44.3	34.6	3.93	1.03
ICT reduces the workload of student teachers.	7	16	40	87	78	3.1	7.0	17.5	38.2	34.2	4.06	1.03
ICT helps student teachers to collect study materials easily.	6	16	31	79	96	2.6	7.0	13.6	34.6	42.1	4.1	0.9
Student teachers are excited to use ICT tools	5	12	21	94	96	2.2	5.3	9.2	41.2	42.1	4.2	0.8
Social networks enable students to share information.	4	6	22	91	105	1.8	2.6	9.6	39.9	46.1	4.2	0.8

The student teachers' perceptions regarding the potential benefits of ICT-based learning are presented in Table 7. In response to the item, 'Technology-based learning has improved or increased self-esteem and confidence,' 40 students remained neutral, while 98 students agreed, and 70 strongly agreed. ICT helps students work in a structured manner and also provides additional support to enhance the learning process. This table also demonstrates that the technology-enabled classroom offers numerous opportunities for students to interact and share ideas (Table 7).

Table 7: Perception of student teachers towards the possible benefits of ICT-based earning

Items	**Frequency**					**Percentage**					**M**	**SD**
	SD	**D**	**N**	**A**	**SA**	**SD**	**D**	**N**	**A**	**SA**		
The technology-enabled classroom provided me with the opportunity to interact, offer assistance, and share ideas.	4	11	25	99	89	1.8	4.8	11.0	43.4	39.0	4.1	0.91
ICT enabled learning, complimented ideas, and supplied more inputs to make work more concrete and clearer	5	12	34	110	67	2.2	5.3	14.9	48.2	29.4	3.9	0.92
ICT-enabled learning increased the ability to communicate and to take criticism in the right spirit	4	19	30	106	69	1.8	8.3	13.2	46.5	30.3	3.9	0.96
Technology-based learning has improved or increased self-esteem and confidence	7	13	40	98	70	3.1	5.7	17.5	43.0	30.7	3.8	0.99

Table 8 demonstrates the barriers to the effective use of technology in the classroom. In the student's response to the item "limited knowledge of computers," 107 students reported having limited knowledge of computers. This represents a significant barrier to implementing ICT-enabled classrooms. The table also clearly indicates that the barriers to the effective use of technology in the training classroom include a lack of computer knowledge, limited access to computers, time constraints, a shortage of skilled personnel, and others.

Table 8: Perception of Student Teachers towards Barriers to the effective use of Technology in the Classroom

Items	Frequency					Percentage					M	SD
	SD	D	N	A	SA	SD	D	N	A	SA		
Limited knowledge of computers	11	26	39	105	47	4.8	11.4	17.1	46.1	20.6	3.3	1.1
Limited access to the computer lab	16	35	49	96	32	7.0	15.4	21.5	42.1	14.0	3.2	1.2
Lack of Institute support	17	37	55	85	34	7.5	16.2	24.1	37.3	14.9	3.3	1.1
Restrictions in Curricular	20	48	50	83	27	8.8	21.1	21.9	36.4	11.8	3.3	1.1
Limited Time	20	35	60	85	28	8.8	15.4	26.3	37.3	12.3	3.1	1.2
Lack of computer skills of teachers	22	37	47	91	31	9.6	16.2	20.6	39.9	13.6	3.1	1.3
Lack of interest among students	27	51	42	79	29	11.8	22.4	18.4	34.6	12.7	3.1	1.2
Lack of computer-based materials	31	47	42	75	33	13.6	20.6	18.4	32.9	14.5	3.1	1.3
Inflexible teaching methods	21	33	61	82	31	9.2	14.5	26.8	36.0	13.6	3.3	1.1
Lack of adequate technical support	23	39	60	76	30	10.1	17.1	26.3	33.3	13.2	3.2	1.1
Better teaching takes place without technology	25	46	45	86	26	11.0	20.2	19.7	37.7	11.4	3.1	1.19
It is costly in terms of resources, time, effort	22	47	54	72	33	9.6	20.6	23.7	31.6	14.5	3.2	1.2
Demands too much time be spent on technical problems	26	34	58	82	28	11.4	14.9	25.4	36.0	12.3	3.2	1.1

Regarding the simplicity of integrating ICT into the teaching and learning process, the percentage of responses is almost the same (Table 9). While 29 students did not respond, 100 students required fundamental ICT skills to aid in their learning. Given that ICT skills are essential for improving their practice in the teaching-learning process, the figure is highly significant.

Table 9: Responses on "ICT skills are required to practice in the teaching-learning process"

	Frequency	Percentage	Valid %
Strongly Disagree	7	3.1	3.1
Disagree	9	3.9	3.9
Neutral	29	12.7	12.7
Agree	100	43.9	43.9
Strongly Agree	83	36.4	36.4
Total	228	100.0	

Regarding the ease of using ICT tools to enhance the learning process, the percentages of respondents are almost equal (Table 10). Thirty-nine students do not care about ICT tools, yet 92 students need to know about them in order to make their lessons more engaging. The figure is highly significant, given that the ICT tools are essential for making the teaching-learning process more exciting and enjoyable.

Table 10: Responses on "ICT tools make the learning process more interesting and exciting"

	Frequency	Percentage	Valid %
Strongly Disagree	6	2.6	2.6
Disagree	9	3.9	3.9
Neutral	39	17.1	17.1
Agree	82	36.0	36.0
Strongly Agree	92	40.4	40.4
Total	228	100.0	

Regarding the ease of using ICT to comprehend subjects outside the curriculum, the percentages of respondents are almost equal (Table 11). One hundred one student teachers are benefiting from using ICT to understand the topics, while 30 students remain unconcerned. This figure is highly significant. This means that the student and teacher benefit from using ICT to understand important concepts that extend beyond the curriculum.

Table 11: Responses on "it helps us to learn topics beyond our curriculum"

	Frequency	Percentage	Valid %
Strongly Disagree	6	2.6	2.6
Disagree	9	3.9	3.9
Neutral	30	13.2	13.2
Agree	101	44.3	44.3
Strongly Agree	82	36.0	36.0
Total	228	100.0	

The proportions of respondents are nearly identical regarding the importance of ICT in quality teacher education programs (Table 12). One hundred two student teachers require a quality teacher education program by ICT, while 38 students remain unconcerned with this concept. Eighty-two students strongly support this idea to inculcate into the teacher education programs. Thus, the influence of ICT enhances the launching of quality teacher education programs.

Table 12: Responses on "ICT enhances the quality of teacher education program"

	Frequency	Percentage	Valid %
Strongly Disagree	7	3.1	3.1
Disagree	2	0.9	0.9
Neutral	38	16.7	16.7
Agree	102	44.7	44.7
Strongly Agree	79	34.6	34.6
Total	228	100.0	

The ANOVA test was conducted to examine the relationship between the demographic variable (qualification) and various attributes related to the use of ICT in the learning process (Table 13). The attributes showing significant results are presented in Table 13. The ANOVA test reveals that the relationship between educational qualification and certain statements regarding the advantages of ICT tools in classroom learning, the potential benefits of ICT tools, and the barriers to their adoption is significant at the 0.05 level of significance. The other attributes of ICT are not significant at the 0.05 level of significance and are therefore not presented in the report.

Table 13: Results of ANOVA test based on educational qualification

		Sum of Squares	df	Mean Square	F	Sig.
Advantages of ICT tools in classroom-based learning						
It encourages revision and better communication	Between Groups	7.137	3	2.379	2.881	.037
	Within Groups	184.981	224	.826		
	Total	192.118	227			
The use of ICT tools can stimulate logical thinking	Between Groups	9.828	3	3.276	3.666	.013
	Within Groups	200.154	224	.894		
	Total	209.982	227			
ICT tools make the learning process more interesting and exciting	Between Groups	9.208	3	3.069	3.266	.022
	Within Groups	210.524	224	.940		
	Total	219.732	227			
The use of ICT attracts the attention of student teachers	Between Groups	8.186	3	2.729	2.904	.036
	Within Groups	210.494	224	.940		
	Total	218.680	227			
ICT reduces the workload of student teachers.	Between Groups	9.071	3	3.024	2.883	.037
	Within Groups	234.943	224	1.049		
	Total	244.013	227			
ICT helps student teachers to collect study materials easily	Between Groups	10.068	3	3.356	3.213	.024
	Within Groups	233.945	224	1.044		
	Total	244.013	227			
Benefits of ICT-based learning						
ICT-enabled learning increased the ability to communicate and to take criticism in the right spirit	Between Groups	7.172	3	2.391	2.634	.051
	Within Groups	203.297	224	.908		
	Total	210.469	227			
Barriers to the effective use of Technology in the classroom						

Limited knowledge of computers	Between Groups	9.432	3	3.144	2.778	.042
	Within Groups	253.563	224	1.132		
	Total	262.996	227			
It is costly in terms of resources, time, effort	Between Groups	11.291	3	3.764	2.651	.050
	Within Groups	318.020	224	1.420		
	Total	329.311	227			

The t-test analysis of rural and urban students' perceptions is presented in Table 14. The collection of data and uploading of e-resources provided ICT with a wealth of information and data, and restrictions in curricular activities were significant in the independent t-test, as the table demonstrates. The other attributes are not significant in comparison to the perceptions of rural and urban student teachers. These results indicate that student teachers in both rural and urban areas require additional training and orientation on the collection and proper utilization of data, as well as the effective use of ICT in curricular aspects, including uploading and collecting ICT-based resources. The t-test between male and female students with different attributes of ICT use was not significant at the p = 0.05 level of significance.

Table -14: Results of t-test

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
To collect data	Equal variances assumed	6.170	.014	-2.779	226	.006	-.608	.219	-1.039	-.177
	Equal variances are not assumed.			-3.095	80.963	.003	-.608	.196	-.999	-.217
Uploading e-Resources	Equal variances assumed	.056	.813	-2.172	226	.031	-.485	.223	-.925	-.045
	Equal variances are not assumed.			-2.177	69.715	.033	-.485	.223	-.930	-.041
It provides lots of information and data	Equal variances assumed	.008	.929	-2.249	226	.025	-.336	.149	-.630	-.042
	Equal variances are not assumed.			-2.440	77.697	.017	-.336	.138	-.610	-.062
Restrictions in Curricular	Equal variances assumed	1.160	.283	1.978	226	.049	.378	.191	.001	.755
	Equal variances are not assumed.			2.013	71.047	.048	.378	.188	.004	.753

Discussion

To effectively meet the demands of teaching contexts that heavily integrate ICT, students must possess the competencies necessary for using technological tools ethically and productively when searching for and organizing information, solving problems in group settings, and enhancing communication.

Questions about the usage of ICT in many sectors are included in the Application Competencies. Activities include using digital resources to plan and solve problems, creating art as a means of expression, participating in groups that utilize these tools, and effectively communicating with a range of informatics resources.

The student teacher's knowledge foundation on the use of ICT may influence their performance in the learning process. Proper resources must be provided to student teachers to achieve better outcomes from the utilization of ICT. More training and orientation must be provided to student teachers on the use of ICT tools in their teaching and learning processes, as well as during their internship classes, lesson plan preparation, lesson delivery, and internet resource searching.

Teachers of different DIETs must be aware of ICT resources available in the classroom and on the campus corridor. The institute must have a Wi-Fi-connected system so that each student can access various resources over the network. They also employed various assessment practices with the aid of ICT. The creation of own resources, sharing, and communication with others, as well as presentation skills, must be enhanced among students through suitable practices and by providing necessary training to student teachers by skilled personnel.

Teachers can be informed about gender disparities to improve pedagogical design that enhances girls' desire for learning and motivates both girls and boys equally, thereby promoting girls' engagement in ICT-enabled learning activities (Yang & Quadir, 2018). The curriculum must be designed to influence the performance of both boys and girls in their learning. Student teachers never used projectors, multimedia, and graphics applications. They must work on these types of tools to enhance their confidence level. To perform better, each student must have a basic understanding of wikis, simulation tools, Google App Store, blogs, Chat-GPT, OER repositories, virtual labs, and video lectures. Every student teacher must attend different video lectures to enhance their learning skills; for this purpose, teacher educators must provide the necessary support.

Although the student teachers have some ideas about various ICT-based tools, they still require additional knowledge of these tools. They must orient themselves on the particular use of each ICT-based tool. This will help them enhance their learning in the future.

The results presented in the above section depict that student teachers have many advantages from the use of ICT tools in the teaching-learning process. They can easily understand complex concepts. They can generate interest and have fun by using ICT-based tools in science and other subjects. They can utilize charts, PowerPoint presentations (PPTs), videos, photos, smartboards, and assessments in classroom activities. They can also show different TLMs with the help of ICT in the class. They can use this ICT in their practice learning process.

With the help of ICT, the concentration power of the students will be enhanced. They can systematically analyze complex concepts. However, they face some barriers, one of which is limited knowledge of ICT use. Lack of internet facilities, ICT labs, computer-literate personnel, limited time, and inflexible teaching methods, among others. The ANOVA results show a significant value for attributes such as the advantages of ICT and barriers to ICT, particularly about the educational qualifications of student teachers.

Conclusion

The integration of ICT tools and techniques has increased significantly in the field of education. The perception of the essential use of ICT, its utilization in the teaching-learning process, the advantages of ICT tools in classroom-based learning, and overcoming the barriers to the effective use of ICT in the classroom need to be done at different levels of educational institutions. According to the study's findings, students used ICT more than any other application to communicate with peers through inquiry-based and collaborative learning. The ANOVA test reveals that the relationship between educational qualification and certain statements regarding the advantages of ICT tools in classroom learning, the potential benefits of ICT tools, and the barriers to their adoption is significant at the 0.05 level of significance. Furthermore, the t-test of rural and urban students' perceptions indicates that student teachers from both rural and urban areas require additional training and orientation on collecting data and utilizing ICT effectively in curricular aspects, as well as uploading and collecting ICT-based resources. Therefore, it is highly essential to provide training to student-teacher educators in various educational programs to change the perception of integrating ICT into the teaching-learning process.

References

1. Cattagni, A., & Farris, E. W. (2001). Internet Access in U.S. Public Schools and Classrooms: 1994–2000. U.S. Department of Education Office of Educational Research and Improvement.
2. Chemwei & Koech. (2014). Assessment of ICT Integration into Instruction in Teacher Education Institutions in Kenya. International Journal of Advanced Research in Social Science and Humanities, 3(12), 89–94.
3. Dorji, U., Panjaburee, P., & Srisawasdi, N. (2015). Gender Differences in Students' Learning Achievements and Awareness through Residence Energy-Saving Game-Based Inquiry Journal of Computers in Education, 2(2), 227–243. https://doi.org/10.1007/s40692-015-0033-2.
4. Ficklen, E., & Muscara, C. (2001). Harnessing technology in the classroom. Am Educ 25(3):22–29.
5. Goel, A., & Gupta, M. (2012). ICT and teacher education. Asian Journal of Multidimensional Research, Vol. 1, Issue 3.
6. Gülbahar, Y. (2008). ICT Usage in Higher Education: A Case Study of Pre-Service Teachers and Instructors. The Turkish Online Journal of Educational Technology, Vol. 7, No. 1, Article 3. Retrieved from http://www.tojet.net/articles/v7i1/713.pdf
7. Holmes, B., Savage, T., Tangney B. (2000). Comparative International Research on Best Practice and Innovation in Learning, The Lifelong Learning Group, The Information Society Commission, Dublin
8. Khokhar, A.J. & Javaid, S. (2016). Students' and Teachers' Perceptions of ICT Use in Pakistani Classrooms. The Asian Conference on Technology in the Classroom.
9. Koh, J. H. L., & Frick, T. W. (2009). Instructor and student classroom interactions during technology skills instruction for facilitating pre-service teachers' computer self-efficacy. Journal of Educational Computing Research, 40(2), 211-228.
10. Listari, D., and Rozimela, Y. (2021). The Perception of Students on Using ICT in an ESP Course at the Faculty of Mathematics and Science, Universitas Negeri Padang. 67th TEFLIN International Virtual Conference & the 9th ICOELT.

11. Mishra, S., & Panda, S. (2020). Technology-Enabled Learning: Policy, Pedagogy and Practice. Commonwealth of Learning, Canada.
12. Mohalik, R. (2020). Digital Literacy and Its Application by Secondary-Level Teacher Trainees in Odisha. Randwick International of Education and Linguistics Science (RIELS) Journal. 1(2), pp.226–234. DOI: https://doi.org/10.47175/rielsj.v1i2.90
13. N.U. Irfan, A.J. Noor. ICT skills, practices, and barriers to its use among secondary school students. Procedia- Social and Behavioral Sciences, 46 (2012), pp. 5672–5676.
14. Nasreen, N. & Chaudhary, Firdaus. (2018). Perception of Pre-Service Teachers Towards ICT Integration in Teacher Education in India. Proceedings of the 2018 International Conference on Education Technology Management. (pp. 11-14). DOI: https://dl.acm.org/doi/abs/10.1145/3300942.3300948
15. Nusir, S., Alsmadi, I., Al-Kabi, M., & Sharadgah, F. (2013). Studying the impact of using Multimedia interactive programs on children's ability to learn Basic Math Skills. E-Learning and Digital Media, 10(3), 305–319. https://doi.org/10.2304/elea.2013.10.3.305.
16. Peralta, S. T. P. and Ruales, C.T.A., 2011. Information and Communications Technology (ICT) Integration in Teacher Education Institutions. The Mindanao Forum Vol. XXIV, No. 2. Retrieved from https://www.academia.edu/46956600/ICT_Integration_in_Teacher_Education_Institutions
17. Sahoo, R.& Behera, L., 2022. Use of ICT in Teaching-Learning Process in Elementary Level Teacher Education Institutions of Odisha—Indian Journal of Educational Technology, Volume 4, Issue 1.
18. Sharma, B., (2020). Study of the use of information and communication technology in enhancing the teaching-learning process in professional courses at Panjab University, Chandigarh; Punjabi University, Patiala; and Guru Nanak Dev University, Amritsar.
19. Siatras, A., & Panagiotis, K. (2013). Science Education as Public and Social Wealth: The Notion of Citizenship from a European Perspective.
20. Sivin-Kachala, J. (1998). Report on the Effectiveness of Technology in Schools. Software Publisher's Association, New York, pp 1990–1997.
21. Tabira, Y. and Otieno, F. X. (2017). *Integration and Implementation of Sustainable ICT-Based Education in Developing Countries: A Low-Cost, En Masse Methodology in Kenya. Sustainability Science, 12(2), 221–234*. doi:10.1007/s11625-017-0422-8.
22. Tay, H. Y. (2016). A longitudinal study on the impact of iPad use on teaching and learning. Cogent Education, 3(1), 1127308. https://doi.org/10.1080/2331186X.2015.1127308.
23. Thomas, S.A. (2014). Information and communication technology-enabled education and governance in the state of Kerala. Unpublished Ph.D. thesis. Union Christian College, Kerala.
24. UNESCO (2002). Information and Communication Technologies in Teacher Education: A Planning Guide. UNESCO: Paris. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000129533
25. Vanan, M.M. (2020). ICT – Enabled Teacher Education. Conference proceeding. Retrieved from https://www.researchgate.net/publication/342600111
26. Yang, J. C., & Quadir, B. (2018). Individual Differences in an English Learning Achievement System: Gaming for Experience, Gender Differences, and Learning Motivation. Technology Pedagogy and Education, 27(3), 351–366. https://doi.org/10.1080/1475939X.2018.1460618