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Modern ICT Technology Transforming the Education Sector based on Teaching and Learning Support Systems and Solutions for Higher Education Practices

[1]Dr. Jigyasu Kumar, [2]Ms. U Rajeswari, [3]Alexandra Valeriano-Meneses, [4]Lorena Casanova-Imbaquingo, [5]Santiago Otero-Potosi, [6]Cristina Suarez-Valencia

[1]Sr. Manager (HR), Rashtriya Ispat Nigam Ltd. (Under Administrative Control of Ministry of Steel, Govt. of India), Patna, Bihar

[2]Assistant Professor, Department of Business Administration, Kalasalingam Academy of Research and Education, Krishnankoil, Virudhunagar, Tamilnadu

[3]Professor, Department of Mathematics, Unidad Educativa Ibarra, Ibarra, Ecuador

[4]Professor, Department of Investigation, Instituto Superior Universitario Cotacachi, Cotacachi, Ecuador

[5]Professor, Department of Investigation, Instituto Superior Tecnológico Liceo Aduanero, Ibarra, Ecuador

[6]Professor, Department of Investigation, Instituto Superior Tecnológico Liceo Aduanero, Ibarra, Ecuador

ABSTRACT

The quick mix of modern Information and Communication Technology (ICT) has introduced a ground-breaking time in the education sector, especially in higher education practices. Modern mechanical solutions powering teaching and learning assistance technologies have played a key role in transforming traditional educational standards. ICT is seen in India as one of the key elements in changing the nation for the better in the future. The Service of Education recognizes the value of integrating technology-based teaching and learning into the public education plan of the schools through the most recent Education Blue print (2013–2025). The goal of this paper is to dissect educators' assessments of how well ICT reconciliation supports the teaching and learning process in study halls. A survey was distributed at random to all 101 teachers from Delhi, India's 12 public optional schools. The results show that there is exceptional potential for ICT coordination for both teachers and students. Findings show that one of the key factors influencing the success of technology-based teaching and learning is teachers' remarkable familiarity with ICT tools and workspaces. Additionally, it was shown that effective teacher preparation programs played a significant role in raising the calibre of learning for students.

Keywords: Modern, Information and Communication Technology ICT Technology, Transforming, Education Sector, Teaching, Learning Support Systems, Solutions, Higher Education Practices

1. INTRODUCTION

The combination of Information and Communication Technology (ICT) has become one of the primary drivers of the dramatic transformation of the education sector in the modern era, particularly in the area of higher education practices. Traditional methods of teaching and learning are being rethought as innovative ideas become ready for a more potent and natural learning environment. The use of contemporary teaching and learning support systems, which affect the capabilities of cutting-edge solutions, best captures this shift in viewpoint. The educational landscape is changing and moving beyond the constraints of conventional methods as institutions of higher learning increasingly adopt these cutting-edge advances. This acquaintance suggests looking into the intricate relationship between contemporary ICT and higher education, delving into the revolutionary effects of learning support systems and their critical role in determining the future of academic practices.

The introduction of contemporary ICT has upended the traditional educational paradigm by providing teachers and students with an alternative selection of tools and resources that enhance the teaching and learning process. For example, man-made intelligence, or brainpower, has emerged as a powerful ally in individualized learning, tailored education, and tailored critique. Advances in expanded reality (AR) and computer-generated reality (VR) enhance the vivid learning environment by enabling students to interact creatively and experientially with the course materials. These advancements foster a more

extensive and dynamic instructional biological system in addition to attending to the growing preferences of attentively localized students.

The capabilities of contemporary ICT-driven teaching and learning support systems extend beyond the confines of traditional study halls. Cooperative learning environments, online learning platforms, and e-learning modules are becoming essential components of higher education procedures. In order to overcome topographical obstacles and foster a global student community, understudies and instructors collaborate consistently using joint effort tools and constant contact. The flexibility afforded by these developments allows for nonconcurrent learning, allowing for a variety of programs and providing access to education for those who may be forced by temporal or geological constraints.

Given the ever-changing landscape of higher education, foundations are gradually realizing how important it is to accept and work with these mechanical solutions. Acceptance of contemporary ICT enhances the quality of education and equips students with the skills necessary for the digital age. Teachers, executives, and legislators must examine the challenges and opportunities these advancements provide as the education industry continues its digital transformation. This study of the function of teaching and learning support systems in the context of contemporary ICT paves the way for a comprehensive understanding of how technology is transforming practices in higher education and preparing students for a future marked by constant innovation and development.

2. LITERATURE REVIEW

The readiness of Nigerian grade teachers to integrate Individual Reaction Systems (PRS) in ESL homerooms is examined in detail in Agbatogun's (2012) review. The test highlights the significance of teachers' readiness to use cutting-edge tools and their impact on teaching English as a second language. The review identifies potential challenges and provides examples of how teachers can successfully integrate PRS into their instructive methods. The findings suggest that although embracing technology is essential for enhancing ESL instruction, there may be obstacles related to planning, structure, and social reflection. The need of resolving these issues to promote productive technology coordination in ESL study rooms is highlighted in Agbatogun's work.

The review by Chien, Wu, and Hsu (2014) focuses on teachers' beliefs regarding technology-based assessments and their actual use in the homeroom. This analysis looks into the relationship between teachers' beliefs, their methods of instruction, and the integration of technology-based assessments in ESL classrooms. The analysis reveals that teachers' beliefs play a crucial role in influencing how they use technology during assessments. Expanding the use of technology-based assessments is associated with positive beliefs about its sufficiency. However, the findings also highlight the necessity of designated professional development to fill up any gaps in educators' mechanical aptitude and to modify their beliefs to align with best practices in assessment.

The study by Ghavifekr, Afshari, and Amla Salleh (2012) focuses on general e-learning system strategies, considering them as a vital component of foundational transformation. The study used a subjective investigation methodology to explore the challenges and potential opportunities associated with implementing e-learning technologies in educational environments. The findings highlight how important it is to have workable administrative processes in place in order to coordinate e-learning systems. These methods include instructor preparation, hierarchical support, and a comprehensive grasp of the social and relevant factors influencing how well e-learning is received. The evaluation provides important insights into how educational institutions might investigate the nuances of implementing e-learning as a cutting-edge tool in ESL study halls.

Gy. Molnár's (2012) study delves into collaborative creative applications, emphasizing Information and Communication Technology (ICT)-based organized and adaptable solutions with remarkable emphasis. This analysis looks at how these apps impact cooperative learning environments and how planned and adaptable innovations contribute to more advanced learning experiences. According to the findings, collaborative creative applications promote student commitment, communication, and knowledge sharing. The review emphasizes how important it is to adapt educational innovations to the flexible and structured environment in order to satisfy the evolving needs of modern students.

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The study by Hamidi et al. (2011) provides an overview of the role that information technology plays in education. This analysis explores the wider implications of integrating technology into learning environments, focusing on how it affects instructional tactics, understudy dedication, and overall academic outcomes. The findings highlight the positive effects of information technology on enhancing the process of teaching and learning. In order to finally advance a more potent and successful educational experience, the evaluation emphasizes the need for teachers to really use technology to build intuitive and understudy focused learning settings.

3. METHOD

3.1. Research Design

The data collected from each respondent in this inquiry was analyzed using a quantitative approach. The scientists created and finished the survey before distributing it to the designated group of respondents. The research objectives on the viability of ICT mix for understudies in learning and significant components of ICT integration in Delhi state-funded schools were addressed in a limited number of survey parts. The survey was sent in this way in order to collect information from the respondents.

3.2. Population and Sampling

One hundred and one teachers from Delhi's public essential and optional schools made up the full sample of respondents for this survey. Randomly selected respondents with teaching experience were emailed the survey; characteristics like race, orientation, and most advanced teaching experience were not considered. There are no professional preferences as long as the responses support the teaching foundation, especially at Delhi's open essential and auxiliary schools. The analysts specifically sought out instructors from Delhi's public essential and optional schools, since those who have experience teaching are the intended respondents for this inquiry. Consequently, the numbers in the appropriated surveys are not equal when comparing secondary school instructors to primary school teachers.

3.3 ICT And Education

INTEGRATION OF ICT IN TEACHING AND LEARNING

World over, educational institutions are under pressure to integrate Information and Communication Technology (ICT) with teaching, learning, evaluation, research, administrations and professional development. This increased emphasis is justified considering the knowledge, skills, and competencies required by the young generation to survive in an increasingly sophisticated technological world. Undoubtedly, ICT has brought about many challenges and opportunities for education. The educational system needs to come to terms with these new challenges and take full advantage of the opportunities. If educational institutions have to ensure that their students leave the institutions as confident individuals capable of using new technology creatively and productively then their teachers should have the competence to integrate the emerging technologies and the digital content with all their operations. Steps to Integrate ICT

In College level, Integrating Information and Communication Technology in Teaching

– Learning Process involves in the following steps:

1. Awareness: To instruct and creating awareness of Information and communication technology among teachers.
2. Fundamental Knowledge: To create and insert the basic knowledge of the modern technology those are involved in teaching and learning towards teachers. The basic knowledges are (a) Nature of Media, (b) Use of Media in teaching learning process and (c) implementing the media in teaching.
3. Proper Training: It is needed to give proper training to teachers about the equipment and instrument, which are utilized and involved in teaching.
4. Implementation / Put into Practice: After receiving the training, the teachers should implement their training in their teaching and evaluation.

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5. Follow–up Activities: While implementing new technology, there may so many difficulties and experiments arise. These may be eradicated through sharing and consulting the expert.

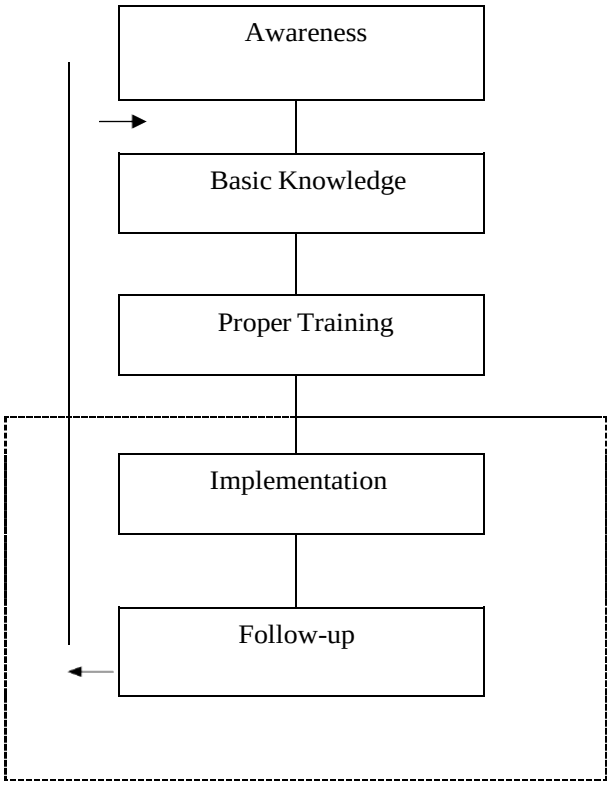

Figure 2: Integrating ICT in Education

ICT has been developed as a new subject in the field of education during the last few years. The term 'Education' includes teaching, learning, instruction and training. In schools, ICT has its application in the following general working areas:

- Curriculum Construction: In the present technological and psychological age, the application of scientific and technological knowledge is much essential for the curriculum construction. The curriculum construction has become a very tedious job in the field of education. It can be simplified with the help of educational technology.
- Selection of Teaching – Learning Strategies: The selection of teaching – learning strategies turns easy with the help of educational technology.
- Selection of Audio-Visual Material: Another important working area of educational technology is that the teacher can select easily the audio-visual aids with its assistance.
- Determination of Educational Objectives: The software aspect of educational technology contributes in the formulation of teaching objectives.
- Teachers Training: The new innovations in educational technology can be used successfully in teachers' training and it is actually being done, such as micro-teaching, stimulated teaching, system approach, classroom interaction and teaching models etc.

Many experts discuss the problem of ICT integration in higher education and suggest that policymakers and teachers may significantly influence this area. Policymakers and educators need to be aware of the connections between technology and the educational framework. In order to achieve the greatest educational benefit from integrating ICTs in education, adequate planning, great strategy, cautious preparation, rebuilding the showing system, and a deliberate methodology are also

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Vol 3 Issue 2 (2023)

required. ICT integration in higher education presents a wealth of benefits while also adding new difficulties. It is also essential to thoroughly examine the goal of education or the setting in which ICTs can be used before adoption. Our definition of education as a catalyst for altering the course of events and improving the general public was used in earlier work.

Figure 3: Education Quality

3.4 Key Challenges in Integrating ICTS In Education

There is no defined formula for figuring out the proper level of ICT integration in the educational system, despite the fact that examples of best practices from around the globe can be helpful. Who would oversee the ICT integration in education program's standards and procedures is one of the worries. It is extremely difficult to coordinate the use of ICTs in education due to ecological, social, and educational issues that are considered by strategy creators, teachers, educational leaders, and students in higher education. We discuss these challenges in the surrounding area in detail.

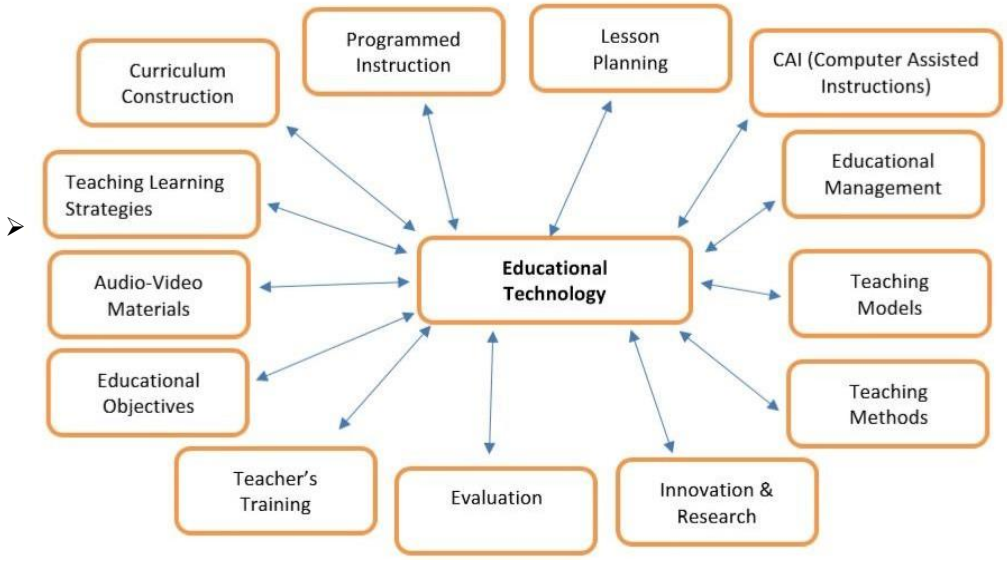

Figure 4: Scope of Educational Technology

It is still impracticable in the modern world for people to be able to work, learn, and study whenever they want and wherever they want. The public telecommunications and information technology foundations constitute the base of a nation's educational technology framework. For the complete integration of ICTs in education, there is a limited provincial foundation. Before implementing ICT in education, policymakers and organizers should carefully consider the following:

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Vol 3 Issue 2 (2023)

• Accessible spaces or buildings suitable for housing the technology. It will be necessary to ensure proper electrical wiring, heating/cooling, ventilation, as well as security and wellbeing, in countries where there are many historic structures.

• The accessibility of energy and communication in the majority of non-industrialized nations, where there are still sizable areas without a dependable electricity source and the closest phone is hundreds of kilometres away.

• Policymakers should also examine the widespread use of various ICT in the nation overall and in the educational system in particular.

- **Cultural challenges**

The diversity of cultures existing around the world complicates how ICT is

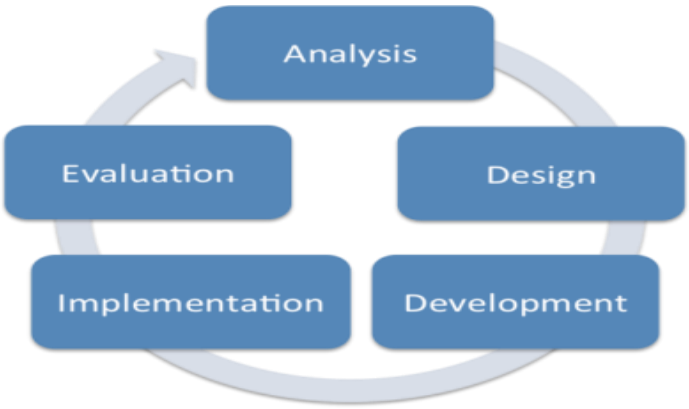

Figure 5: Analysis Process

presented in education. English is the language that is most frequently used online

4. RESULTS

The material required by scientists to respond to the exploratory inquiries will be made available by the investigation's findings. The poll's components round out the results, and some inferential analysis—such as dependability and Mann-Whitney U testing—also yields the total data.

Table 1: Respondents' demographic background

Factors	Frequency	Percentage (%)
Gender		
Female	80	80.02
Male	21	19.08
Race		
Malay	35	30.06
Indian	25	20.04
Chinese	30	25.5
Others	6	23.5
Teaching Experience		
<1 year	25	15.5
1-5 years	35	30.6
6-10 years	30	35.4
>10 years	6	18.5

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Vol 3 Issue 2 (2023)

Type of School		
Primary	40	40.6
Secondary	61	59.4
School Area		
Urban	80	80.2
Rural	21	19.8
Preference of Teaching Style		
Conventional/Traditional	45	50.4
Modern/Contemporary (Use of ICT)	56	49.6
Highest Academic Qualification		
Diploma	14	8.2
Degree	60	60.4
KPLI	20	20.6
Master	7	10.8
The Ability of Handling ICT in Teaching		
High	30	30.7
Medium	60	60.2
Low	11	9.1

Table 1 provides a comprehensive overview of some key characteristics and professional attributes of a group of teachers drawn from the general population (n = 101). It sheds light on aspects such as orientation, race, teaching experience, type of school, school region, inclination towards a particular teaching style, highest level of scholarly competency, and the ability to use information and communication technology (ICT) in the classroom. Surprisingly, 80.02% of the members are female, and different racial groups are portrayed differently: Malay (30.06%), Indian (20.04%), Chinese (25.5%), and others (23.5%). The distribution of teaching experience reveals a somewhat adjusted flow, with 35.4% of teachers having six to ten years of experience. The majority of the members (59.4%) attend optional schools located in urban areas (80.2%). The preference for traditional/conventional methods (50.4%) and modern/contemporary approaches, including ICT (49.6%), is very evenly split. Regarding academic qualifications, the majority have a degree (60.4%), followed by KPLI (20.6%), acknowledgment (8.2%), and expertise (10.8%). ICT handling proficiency varies as well; 30.7% of respondents have a high capacity, 60.2% a medium capacity, and 9.1% a low capacity. All things considered, these findings provide important insights into the diverse backgrounds, experiences, and preferences of educators worldwide.

4.1. Teachers' Views of Technology-Assisted Instruction and Learning

The majority of instructors are aware of the appropriateness and usefulness of ICT in the classroom, according to the statistics regarding educators' perceptions of ICT in the classroom displayed in Table 2. The majority of educators knew that new, updated materials with the lowest mean of 1.72 are made available to teachers via ICT use, which helps them improve their instruction. Teachers can embrace the undeniable fact that online educational resources and tools are more current to set a truly engaging and relatable example for students.

Table 2: Teachers' opinions about using ICT in the classroom

NO	ITEMS	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard Deviation
		Frequency and Percentage (%)					
1.	I'm comfortable picking up new computing abilities.	1	7 (6.8%)	71 (70.4%)	26 (25.9%)	1.83	0.54

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Vol 3 Issue 2 (2023)

2.	I find that using ICT makes teaching easier.	1	13 (12.8%)	71 (70.4%)	20 (19.9%)	1.95	0.57
3.	I see how much potential there is for ICT to support efficient instruction.	1	9 (8.8%)	58 (57.5%)	37 (36.7%)	1.74	0.62
4.	I believe that more effective learning occurs when teaching is aided by ICT.	2 (2%)	9 (8.8%)	55 (54.6%)	39 (38.7%)	1.74	0.67
5.	With more modern resources, teachers can enhance their instruction by utilizing ICT.	2 (2%)	7 (6.8%)	57 (56.5%)	39 (38.7%)	1.72	0.65

4.2. Efficiency of Technology-Based Students' Instruction and Learning

The results of Table 3, which require examination of the ICT combination's appropriateness for students' learning, show that, with the lowest mean score of 1.69, ICT use encourages students to learn dynamically and to create illustrations for their best educational experiences. The majority of teachers in the previous section concurred that students can be more proactive and engaged in the learning process when they use ICT. This indicates that for the best learning experience, students can be more engaged and take on more tasks while using ICT, according to both instructors and students.

Table 3: The efficiency of integrating ICT for students' education

NO	**ITEMS**	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**Mean**	**Standard Deviation**
		Frequency and Percentage (%)					
1.	Students can be more innovative and creative thanks to ICT.	2 (2%)	8 (7.8%)	65 (64.5%)	30 (29.8%)	1.82	0.62
2.	Students can locate relevant knowledge and information for studying with the aid of ICT use.	2 (2%)	5 (5%)	62 (61.5%)	36 (35.8%)	1.73	0.60
3.	Students are encouraged to interact with their peers more when they use ICT.	12 (11.8%)	1	64 (63.5%)	27 (27.8%)	1.86	0.62
4.	Students feel more comfortable participating fully in class when ICT is used.	11 (8.8%)	1	66 (65.5%)	27 (26.8%)	1.86	0.60
5.	I believe that when students use ICT, they learn more efficiently.	7 (6.8%)	1	61 (60.5%)	36 (35.8%)	1.73	0.59

4.3. Effective Components of Technology-Based Instruction in Educational Settings

The 1.99 mean score indicates that, according to the statistics, teachers do not seem to have enough time in the classroom to use ICT for teaching and learning. It implies that accommodations be made for educators at all times so they can use

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Vol 3 Issue 2 (2023)

ICT to design interesting lessons and activities for students. Giving teachers greater opportunities to use ICT in the classroom with the goal of achieving success is a great idea. The majority of educators concurred that a mean of 1.99 ICT device waste is caused by instructors' ignorance of and inexperience with using the ICT tools at their schools.

Table 4: ICT integration strategies that work well for teaching and learning in public schools

NO	ITEMS	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard Deviation
		Frequency and Percentage (%)					
1.	The ICT resources available to me at school are operational and usable.	35 (34.8%)	37 (36.7%)	23 (22.9%)	10 (9.8%)	2.96	0.98
2.	If teachers run into problems, they can get technical support.	30 (29.8%)	37 (36.7%)	27 (26.8%)	11 (8.8%)	2.85	0.98
3.	I am unable to use ICT in my classroom due to limited access to it.	4 (4%)	17 (16.9%)	63 (62.5%)	21 (20.9%)	2.04	0.70
4.	My reluctance to use ICT stems from the senior management of the school's lack of support.	7 (6.8%)	21 (20.9%)	52 (51.6%)	25 (24.9%)	2.10	0.84
5.	I cannot utilize ICT for teaching and learning during teaching hours.	2 (2%)	22 (21.9%)	54 (53.6%)	27 (26.8%)	1.99	0.73

4.4. Reliability Testing

The results of an uncompromising quality audit for a survey assessing instructors' judgment and confidence in using information and communication technology (ICT) for education are shown in table 5. Following the removal of the specific item, the absolute connection values of the corrected item indicate how each item is related to the overall score. The following items demonstrate moderate associations with the all-out score: "I feel certain learning new PC abilities" (0.34), "I find it simpler to show English language by utilizing ICT" (0.40), and "I'm mindful of the extraordinary open doors that ICT offers for powerful teaching" (0.50). With a criterion of 0.63, the Cronbach's Alpha qualities demonstrate the inner consistency dependability of the entire scale. It turns out that deleting particular items could actually strengthen the overall scale stability, as supported by the Cronbach's Alpha if Thing Erased values. Eliminating the statement "Little admittance to ICT keeps me from involving it in teaching" for instance might increase the reliability of the measure from 0.63 to 0.65. Overall, the findings suggest that the poll should have a reasonable level of internal consistency because specific items may have an effect on the overall stable quality if they are omitted. It is possible that additional refining and careful consideration can improve the instrument's viability and reliability in capturing teachers' attitudes about ICT in the classroom.

Table 5: Evaluation of Internal Coherence and Dependability Criteria for Educational Technology Survey Items

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha	N of Items
I'm comfortable picking up new computing abilities.	0.34	0.60	0.63	17
I think utilizing ICT to teach English makes it easier.	0.40	0.60		

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Vol 3 Issue 2 (2023)

I see how much potential there is for ICT to support efficient instruction.	0.50	0.58		
Students can be more innovative and creative thanks to ICT.	0.63	0.88	0.89	12
Students can locate relevant knowledge and information for studying with the aid of ICT use.	0.50	0.89		
Students are encouraged to interact with their peers more when they use ICT.	0.63	0.88		
The ICT resources available to me at school are operational and usable.	0.56	0.56	0.65	12
If teachers run into problems, they can get technical support.	0.60	0.55		
I am unable to use ICT in my classroom due to limited access to it.	0.07	0.67		

4.5. Hypothesis Testing

In this assessment, the Mann-Whitney U Test is used to test the analyst's conjecture (see Table 6). The exam's purpose is to evaluate how two independent groups differ from one another concerning a particular ward characteristic. The expert confirms the scientist's incorrect hypothesis using an inferential analysis using the Mann-Whitney U Test. The Mann-Whitney U test is used to assess the effectiveness of two drugs in the early phases of clinical trials. When data are not regularly gathered, it is frequently offered as a good substitute for the ideal test.

H01 - The way primary and secondary school teachers view the use of ICT in the classroom does not significantly differ from one another.

Table 6: Mann-Whitney U-test comparing the type of school and teachers' perspectives on ICT integration

	Type of School	**N**	**Median**	**Range**	**Mean Rank**	**Mann-Whitney U**	**p**
Score_ B	Primary	40	2.35	2.22-2.35	60.90	857.00	0.02**
	Secondary	61	2.22	1.97-2.35	47.88		

The results presented in Table 7 show that there is a significant difference in the way educators view ICT based on the type of school (Mann-Whitney U= 857, P= 0.02). Grade schools scored higher than optional schools, which scored in the middle (2.22) and mean position (47.88). Grade schools scored higher than optional schools. After then, the optional theory is accepted and the baseless hypothesis is rejected.

H02 - The efficiency of ICT integration for pupils in learning with the school area (rural vs. city) does not significantly differ.

Table 7: Mann-Whitney U-test comparing how well students use ICT to integrate learning with the classroom

	School Area	**N**	**Median**	**Range**	**Mean Rank**	**Mann-Whitney U**	**p**
Score_ C	Urban	80	1.62	1.42-2.02	48.94	549.00	0.01**
	Rural	21	2.02	1.62-2.37	67.66		

The findings show that the effectiveness of ICT integration for students' learning varies significantly depending on the school region (Mann-Whitney U= 549, P= 0.01), with the province's schools scoring higher than the city region's (48.94)

in both mean position (67.66) and middle (2.02). Consequently, the optional conjecture is accepted and the baseless hypothesis is rejected.

5. DISCUSSION

The review's findings show that technology-based teaching and learning is more successful than conventional study halls. This is so that both teachers and students can benefit from a functional learning environment that is highly captivating and engaging thanks to the usage of ICT tools and equipment. The outcomes align with Macho's (2005) study, which demonstrated that incorporating ICT into the classroom enhances student learning. However, as students are politer and more engaged, most teachers in this evaluation concur that ICT advances homeroom leadership. Additionally, this study demonstrated how understudies can learn even more when they use ICT to make very captivating and interesting graphics. The panelists also concurred that synchronization of ICT can help pupils learn.

Zhang (2013) found that teachers in Northwest China are using the Web to teach and learn English as a foreign language. They also demonstrate that educators have a favourable attitude toward using the Internet for instruction; educators possess some knowledge about using the Internet for instruction, but it has not yet been completely incorporated into instruction; educators know very little about ICT and network technology. Furthermore, the results of this study and the preceding two focuses were consistent, suggesting that most instructors think it is possible for understudies to use ICT for learning. ICT fosters students' growth in imagination and creativity as their worldview broadens by giving them the self-assurance to communicate more effectively and to be eager to share their views. Lastly, by giving pupils access to vital information, ICT supports the development of all four learning capacities in students. Whatever the case, this analysis reveals that there are insufficient possibilities for state-funded instructors in Delhi, India to become proficient in ICT use.

It was discovered that most educators think that ICT coordination is possible, but the ICT tools offered in schools are neither sufficient nor attractive; instructors are not adequately prepared for proficient advancement; specialized supports are offered in one way or another but may occasionally be improved; and the state of the school's PC lab, which lacks well-functioning tools and offices, is generally subpar. These findings contrast with a review by Tazci (2011), which shows that the majority of pre-administration educators only use basic ICT tools for educational purposes.

6. CONCLUSION

The initial phase of ICT adoption needs to be practical for teachers and students to utilize. In this way, the entire school administration is responsible for initiating the implementation and approving the support of technology-based teaching and learning arrangements. If the technology mix implementation cycle is properly executed throughout the school and ongoing support is given, ICT coordination in schools will be a huge success and benefit for both teachers and kids. Educators should have the opportunity to learn about ICT, conduct research on it, and go through the "experimentation" stage before they are fully comfortable with it and prepared to use it for teaching and learning. This is because, in contrast to theories, the use of ICT in teaching and learning is primarily about common sense. Since it is the duty of educators to guarantee the skillful and effective implementation of any new arrangements. The innovations being driven by cutting-edge technology and communication devices should be available to students anytime they have time to study, no matter where they are. Furthermore, educators need to be informed, skilled, and proficient in using ICT to further develop their methods and approaches in order to fulfill the needs of teaching in the twenty-first century and improve effective learning.

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