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Emerging Digital Pedagogy: An Analytical Study of Prospective Teachers' Perceptions of ICT Integration in Classroom Teaching

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Abstract

In an era of digital transformation, Information and Communication Technology (ICT) plays a crucial role in shaping educational practices. The effective integration of ICT into classroom teaching has become essential for preparing future-ready learners. This study explores the perceptions of prospective teachers regarding ICT's role in classroom teaching, focusing on B.Ed. students from Tiruvannamalai district, Tamil Nadu. ICT tools, such as projectors, smartboards, internet platforms, and multimedia, are recognized as transformative, enhancing accessibility, engagement, and instructional quality. The research assessed perceptions based on gender, age, religion, marital status, and family income. Using a normative survey method, data were collected from a random sample of 300 prospective teachers and analyzed using the "Teacher's Perception on ICT Scale (TPICTS)" with mean, standard deviation, t-tests, and ANOVA. The findings show a generally positive perception of ICT, with female and younger participants showing more enthusiasm. Challenges such as inadequate infrastructure and insufficient training were also identified. The study highlights the need for reforms in ICT training, curriculum enhancement, and infrastructure support.



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INTRODUCTION

As Jean Piaget insightfully emphasized, the essence of education lies not in rote memorization but in fostering the individual's capacity to adapt and innovate. In the 21st century, this vision is especially relevant as education systems worldwide undergo rapid transformation to meet the demands of a dynamic, knowledge-driven society. Central to this transformation is the integration of Information and Communication Technology (ICT), which has become a cornerstone of quality education. ICT facilitates not only the dissemination of knowledge but also the development of key competencies such as cognitive flexibility, technological fluency, and global citizenship. ICT includes a broad spectrum of tools and platforms—from radio, television and computers to the internet, educational software, and mobile learning applications—that support and enhance the educational process. It enables both synchronous and asynchronous learning, making education more accessible across temporal and spatial constraints. Particularly in remote or underprivileged areas, ICT offers unprecedented opportunities to bridge gaps in educational access, equity, and quality. Despite its transformative potential, the effective integration of ICT into classrooms and teacher education remains a complex challenge. Many teacher educators and pre-service teachers lack adequate ICT training, both in terms of technical skills and pedagogical strategies. Infrastructural deficits—particularly in rural and economically disadvantaged regions—along with psychological resistance to change and institutional inertia, further compound the issue. Furthermore, policy frameworks often fail to translate into effective implementation due to resource constraints or insufficient operational clarity.

In India, the challenges associated with ICT integration are particularly evident in the teacher education sector. The dismal pass rate in the Central Teacher Eligibility Test (CTET) highlights the gaps in pre-service teacher preparedness, especially in digital competencies. This situation calls for urgent reforms in teacher education programs to incorporate robust ICT training, ensuring that prospective teachers are equipped to meet the demands of contemporary classrooms. National initiatives such as SWAYAM, NPTEL, Shodhganga, and the Virtual Technical University aim to democratize access to quality educational resources, yet their impact is contingent upon effective integration into teacher training curricula. Conversely, the benefits of ICT integration are well-documented. ICT facilitates self-paced and personalized learning, enhances engagement, and supports collaborative and inclusive education. It empowers teachers with tools for continuous professional development and provides real-time data for monitoring learner progress. Furthermore, ICT enables educators to participate in global knowledge networks and adopt interdisciplinary teaching practices, thereby enriching the educational experience.

The relevance of this research lies in examining how prospective teachers perceive the role of ICT in classroom teaching. Their perceptions are critical, as they shape future teaching practices and influence the extent to which ICT can be integrated meaningfully into pedagogical contexts. Understanding these perceptions can inform teacher education curricula, policymaking, and resource allocation, ultimately contributing to more effective and equitable educational outcomes.

This study aims to explore the insights, attitudes, and readiness of prospective teachers concerning the role of ICT in enhancing instructional quality and learning outcomes. By analysing these perceptions,

the research intends to highlight both the opportunities and challenges in ICT adoption and provide recommendations for strengthening ICT integration in pre-service teacher education programs.

NEED FOR AND IMPORTANCE OF THE STUDY

In the 21st century, Information and Communication Technology (ICT) plays a transformative role in education by enhancing teaching methods, learner engagement, and access to resources. With education rapidly evolving towards digital integration, it is essential that prospective teachers are adequately prepared to incorporate ICT in classroom instruction. However, in many parts of India, including districts like Tiruvannamalai, there remains a significant gap between policy initiatives promoting ICT and actual classroom practices. Teacher education programs often do not provide sufficient training or exposure to ICT tools, leading to low confidence and limited usage among pre-service teachers.

Their perceptions towards ICT are crucial as they influence future classroom practices and the overall success of technology integration in schools. Moreover, socio-demographic factors such as gender, age, religion, marital status, and family income may affect their attitudes and access to ICT.

Hence, there is an urgent need to examine how prospective teachers perceive the role of ICT in teaching, to identify barriers, and to recommend strategies for effective integration. This study seeks to generate insights that will help improve teacher training curricula, strengthen ICT adoption, and ultimately enhance the quality of education in rural and semi-urban areas.

OBJECTIVES OF THE STUDY

To find the level of prospective teachers' perception on the role of ICT in classroom

teaching in Tiruvannamalai district with respect to Gender and Age. To find out the significance difference if any, in the level of prospective teachers' perception on the role of ICT in classroom teaching with respect to Religion, Marital Status and Monthly income of the Family.

HYPOTHESES OF THE STUDY

The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district is Average.

The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district in terms of Gender is Average.

The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district in terms of Age is Average.

There is no significant difference between the prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Religion.

There is no significant difference between the prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Marital status.

There is no significant difference among the prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Monthly income of the Family.

METHOD OF STUDY

The current research utilizes the normative survey method, a research technique that is aimed at gathering data from a large group of people in order to study prevailing conditions, opinions, or behaviour.

This technique assists in comprehending patterns, trends, and relationships by collecting information via questionnaires, interviews, or observations, hence being a common method in social and educational research.

SAMPLE

Study population is 300 prospective teachers selected at random from B.Ed College in Tiruvannamalai district. The selected prospective teachers varied academic backgrounds, learning conditions, and socio-economic standards to facilitate detailed study of the research variables. The prospective teachers are to be selected with the purpose of obtaining a balanced and representative sample to facilitate the validity and reliability of the study.

TOOLS USED IN THE PRESENT STUDY

"Teacher's perception on ICT scale (TP ICTS)", June 2010.

ANALYSIS OF DATA

To find the meaningful interpretation of the raw scores, the investigator used mean, S.D, 't' test and 'f' test to analyse the data.

Hypothesis - 1

The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district is Average.

From Table 1 it is evident that the level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district is Average

Hypothesis - 2

The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district in terms of Gender is Average.

From Table - 2, it is evident that the level of prospective teachers' perception on the role of ICT in classroom teaching at

Table 1 The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district

Description	No of samples	Low		Average		High	
		No	%	No	%	No	%
Prospective teacher's perception	300	21	7	243	81	36	12

Table 2 The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district in terms of Gender

Background variable	Category	Number	Low		Medium		High	
			No	%	No	%	No	%
Gender	Male	59	7	11.8	44	74.5	8	13.5
	Female	241	15	6.2	199	82.5	28	11.6

Table 3 The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district in terms of Age

Background variable	Category	Number	Low		Medium		High	
			No	%	No	%	No	%
Age	Age Below 20	36	4	11.11	27	75	5	13.8
	Age 21-25	243	16	6.5	200	82.3	27	11.11
	Age 26 Above	21	0	0	16	76.2	5	23.8

Tiruvannamalai district in terms of Gender is Average.

Hypothesis – 3

The level of prospective teachers 'perception on the role of ICT in classroom teaching at Tiruvannamalai district in terms of Age is Average.

From Table - 3, it is evident that the level of prospective teachers 'perception on the role of ICT in classroom teaching at Tiruvannamalai district in terms of Age is Average.

Hypothesis – 4

There is no significant difference between the prospective teacher's perception on the role of

ICT in classroom teaching in Tiruvannamalai district in terms of Religion.

From the above table, it is evident that the calculated 't' value 1.165 is greater than the table 't' value 1.96 at 0.05 level of significance. It is Not Significant. It is clear that there is no significant difference in role of ICT in classroom teaching of prospective teachers on type of Religion.

Hence the null hypothesis "There is no significant difference in role of ICT in classroom teaching of prospective teachers based on type of gender" is accepted.

Hence, it is evident that the ICT in classroom Teaching of prospective teachers no significant difference in classroom teaching based on type of Religion.

Table 4 't' Value for impact of prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Religion

Sex	Number	Mean	Standard Deviation	t value		Remark
				Calculated	Tabulated	
Hindu	284	212.5	23.4	1.165	1.96	NS
Non-Hindu	16	219.5	24.3			

Table 5 't' Value for impact of prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Marital status

Marital Status	Number	Mean	Standard deviation	t value		Remark
				Calculated	Tabulated	
Married	37	217.7	21.5	1.34	1.96	NS
Unmarried	263	212.2	23.8			

Table 6 'f' Value for impact of prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Monthly income of the Family

Category	Sources of variation	Sum of Square	DF	Mean square	f Value		Remarks
					Calculated	Tabulated	
Family Monthly Income	Between samples	53.9	92	0.586	0.947	3.07	NS
	within Samples	128	207	0.619			

Hypothesis – 5

There is no significant difference between the prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Marital status.

From the above table, it is evident that the calculated 't' value 1.34 is lesser than the table 't' value 1.96 at 0.05 level of significance. It is Not Significant. It is clear that there is no significant difference in role of ICT in classroom teaching of prospective teachers on type of Marital Status. Hence the null hypothesis "There is no significant difference in role of ICT in classroom teaching of prospective teachers based on type of gender" is accepted.

Hence, it is evident that the ICT in classroom Teaching of prospective teachers no significant difference in classroom teaching based on type of Religion

Hypothesis – 6

There is no significant difference among the prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Monthly income of the Family.

From the above table, it is evident that the calculated 'f' value 0.947 is lesser than the table 'f' value 3.07 at 0.05 level of significance. It is Not Significant. It is clear that there is no significant difference in role of ICT in classroom teaching of prospective teachers on type of Family Monthly Income.

Hence the null hypothesis "There is no significant difference in role of ICT in classroom teaching of prospective teachers based on Family Monthly Income" is accepted. Hence, it is evident that the ICT in classroom Teaching of prospective teachers no significant difference in classroom teaching based on family income.

FINDINGS

The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district is Average.

The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district in terms of Gender is Average.

The level of prospective teachers' perception on the role of ICT in classroom teaching at Tiruvannamalai district in terms of Age is Average.

There is no significant difference between the prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Religion.

There is no significant difference between the prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Marital status.

There is no significant difference among the prospective teacher's perception on the role of ICT in classroom teaching in Tiruvannamalai district in terms of Monthly income of the Family.

CONCLUSION

This study reveals that prospective teachers in the Tiruvannamalai district generally hold an average yet moderately positive perception regarding the integration of Information and Communication Technology (ICT) in classroom teaching. While a majority of participants recognized the educational value of ICT in enhancing teaching effectiveness, learner engagement, and personalized instruction, significant challenges such as lack of infrastructure, insufficient training, and inadequate curricular emphasis persist. Gender and age showed minor variations in perception, with female and younger

participants expressing slightly higher enthusiasm, whereas variables like religion, marital status, and monthly family income showed no significant influence on ICT perception. These findings suggest that while there is an overall awareness of ICT's potential benefits among pre-service teachers, actual readiness to implement it meaningfully remains limited due to systemic and contextual barriers. The average level of perception across key demographics further emphasizes the need for targeted interventions in teacher education programs. There is a pressing requirement to embed ICT skill development and pedagogical application into the teacher training curriculum through practical exposure, capacity building, and access to digital resources.

Moreover, national initiatives like SWAYAM, NPTEL, and Shodhganga must be effectively utilized and integrated into pre-service teacher education to foster ICT-enabled instructional practices. Institutions must ensure regular professional development opportunities and provide adequate infrastructure support to enable the successful adoption of digital pedagogy. Overall, strengthening ICT competencies among prospective teachers is essential to transform conventional teaching methods, improve classroom experiences, and prepare future educators for the evolving demands of a digitally-driven education system.

Ethical Approval

No ethical approval was necessary for this study.

Author Contribution

All authors made substantial contributions to the conception, design, acquisition, analysis, or interpretation of data for the work. They were involved in drafting the manuscript or revising it critically for important intellectual

content. All authors gave final approval of the version to be published and agreed to be accountable for all aspects of the work, ensuring its accuracy and integrity.

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