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Impact of ICT on Teacher Engagement in Select Higher Educational Institutions in India

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Abstract: ***The purpose of this study is to assess the relationship and impact of information and communication technology (ICT) on teacher engagement (TE).Data from a cross-sectional study of 324 teachers serving in India were analysed. The participants completed the self-developed ICT questionnaire and teacher engagement scale. The ICT scale measures the availability of ICT infrastructure, support available and its usage in institutes for pedagogical purposes. Regression analysis showed that ICT was positively associated with TE; and had a significant impact on TE.As mentioned earlier, this study is cross-sectional in nature. Further research with longitudinal and experimental studies needs to be carried out to support the results. Regular workshops for teachers can be conducted regarding the usage of ICT. Higher Educational Institutions must incorporate latest ICT in their campuses and become more advanced in terms of technology infrastructure.***

Keywords: Information and communication technology, ICT, teacher engagement, India, higher educational institutions, engagement, ICT infrastructure, teacher

1. Introduction

One of the factors in the success of an individual or organization is how fast the information about latest developments, technology or advancements is made available and how much they are connected with the outside world. Gone are the days when one had to depend on libraries, books, personal contacts for acquiring information or knowledge. To be a successful teacher, a person has to be in touch with all the latest developments in the world, specifically the field he is working in and this is possible only if he has access to information anytime, anywhere. A teacher always has to remain ahead of the students and be well-informed. For this purpose, use of internet, computers and online resources becomes imperative. Nowadays, information from internet and online journals is being used to prepare lessons. ICT has become an essential tool for storage and retrieval of information and its dissemination. It is already established that the use of ICT in teaching benefits both the teachers and learners. Further, ICT makes the institutes 'paperless' as information can be saved in computers as files. Thus, ICT has made institutes more environment-friendly. All these factors have reduced the work load and consequently the stresses and strains in the life of a teacher due to which they can assume more responsibilities in their workplace as well as their personal lives. Teachers' involvement with their careers is enhanced as they are connected 24 X 7 with their colleagues and students. ICT has facilitated the creation of more interest in teaching and enhanced teacher's aptitude. Thus, the availability of ICT infrastructure and support in an institute and its usage could have an impact on the engagement of teachers. The present study examines the impact of ICT on the engagement of teachers in select higher education institutes of India.

1.1 Statement of the Problem

The present study focuses on ICT usage for pedagogical purposes and its association with engagement among teachers in select higher educational institutions in India.

1.2 Significance of the Research

ICT is being applied successfully in instruction, learning, and education and is considered a powerful tool for educational change and reform. Use of ICT can raise educational quality and connect learning to real-life situations. ICT assists in transforming a teaching environment into a learner-centred one. Teachers in higher education institutes feel burdened by an inflated curriculum and one way to reduce the workload is through usage of ICT. There are numerous studies regarding the benefits of using ICT for pedagogical purposes. However, negligible studies have been conducted regarding its effects on the attitudes and beliefs of teachers. This study contributes toward the knowledge on ICT in educational institutions and teacher engagement. This issue is essential to be studied since it can contribute to a more comprehensive understanding of teacher engagement and how ICT can enhance it. The study contributes to the knowledge by adding literature on the Indian studies as well as higher educational institutions.

1.3 Research Questions

There are several research questions that were asked in addressing the problem statement:

- Does the level of ICT usage correlate with teacher engagement in the higher educational institutions under study?
- Does the level of ICT usage vary with regard to demographic variables i.e. gender, ownership, class taught, number of years having used computers/internet, working hours per week and subjects taught in the higher educational institutions under study?

2. Literature Review

A brief literature regarding impact of ICT usage on teacher attitudes and performance in educational institutions is given below:

Lowther et al. (2008) stated that there are three important characteristics needed to develop good quality teaching and learning with ICT - autonomy, capability, and creativity. Autonomy means that students take control of their learning through their use of ICT. Teachers can also authorize students to complete certain tasks with peers or in groups using ICT.

Serhan (2009) concluded that ICT fosters autonomy by allowing educators to create their own material, thus providing more control over course content than is possible in a traditional classroom setting. For example, in an English listening and speaking class, instructors need to refer the dictionary for the pronunciation of difficult words and hence online audio dictionary comes handy.

Watts-Taffeet al. (2003) found that teachers can act as catalysts for the integration of technology through ICT. If the encouragement, equipment, and necessary technological support are available in institutes for teachers, developing an ICT class will be easier for them.

Sangetal.(2010) conducted a study among Chinese teachers and found that teachers' gender, their teaching beliefs, computer self-efficacy, and computer attitudes had a significant impact on their future ICT use. The findings confirmed that the strongest predictor of the future use of ICT was teachers' attitudes toward it.

Sang et al.(2010)further indicated that pre-service teachers who believe in learning through their own experiences had greater readiness and willingness to incorporate ICT into their teaching practices.

Chai, Koh and Tsai (2010) found that ICT courses with direct instruction on the use of technological tools through the technology enhanced lesson (TEL) approach helped teachers learn how to use technologies as supporting tools in order to enhance their teaching and student learning.

Vannatta and Beyerbach (2000) studied the impact of technology on teacher perceptions and attitudes. Increased proficiency in technology applications and instructional methods after the preparation course on ICT was observed. Qualitatively, the pre-service teachers reported greater benefits from the use of technology in the classroom after the course. Thus, more emphasis must be placed on advanced skills in teacher education programs so that teachers can develop lessons using technology.

Educational Institutions are highly recommended to offer their teachers workshops or training courses to improve their ICT skills and prepare them to encounter possible challenges while integrating technology in order to improve teachers' professional development on ICT use (Staples, Pugach and Himes, 2005).

2.1 Gaps in existing literature

A review of the existing literature makes it apparent that the benefits of ICT in teaching and learning have been explored to a great extent. However, there are very few studies in the Indian context possibly due to the late integration of ICT into education in India. There are negligible studies that relate ICT usage to teachers' attitudes and beliefs. Hence, this study seeks to address that gap by studying the link between ICT usage and teacher engagement.

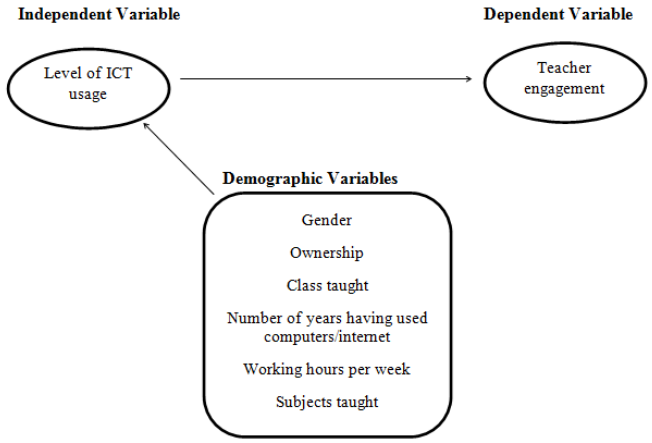

Figure 1: Research Model for this study

3. Hypotheses

Based on the literature review, the present research investigates the relationship among level of ICT usage and teacher engagement as well as the differences in the level of ICT usage with regard to demographic variables. The following are the main hypotheses of the study.

H1.There is a significant relationship between the level of ICT usage and engagement among teachers.

H2. There is a significant difference in the level of ICT usage among teachers with regard to demographic variables i.e. gender (2.1), ownership (2.2), class taught (2.3), number of years having used computers/internet at any institute (2.4), working hours per week (2.5) and subjects taught (2.6).

4. Method

4.1 Sample

A cross-sectional survey design was used to test the proposed hypotheses. The respondents for this study comprised teachers serving in select higher educational institutions in various places in north India. Snowball sampling method was used to select respondents. Majority of the respondents were serving in Punjab and Haryana. Data were also collected from teachers serving in Delhi, Uttar Pradesh and Himachal Pradesh. A sample of 324 teachers was selected for the purpose of the study.

4.2 Demographics
Six demographic variables were included as covariates in the analyses as they were considered to be important for research into teacher engagement: gender, ownership, class taught, working hours per week, number of years having used computers/internet at any institute and subjects taught. The response scales were gender (1 = Male to 2 = Female), ownership (1 = government, 2 = private), class taught (1 = graduate, 2 = postgraduate), working hours per week (1= 2 – 4 hours to 3 = 8 or more hours), number of years having used computers/internet at any institute (1 = Less than 3 years to 3 = More than 6 years) and subjects taught (1 = Humanities, 2 = Science, 3 = Management).

4.3 ICT Scale
Self-designed scale measures the teacher's experience using ICT for teaching, access to ICT infrastructure, support available and ICT based activities and material. The scale consists of 14 items in a five point likert format where one corresponds to strongly disagree and five corresponds to strongly agree. Some examples of questions include "The institute has provided me with access to internet", "I browse the internet to access digital learning material in order to prepare lessons", "I use PowerPoint presentations or videos to teach students", "I post exercises or tasks for students over the internet". High scores should correspond to high level of ICT usage for educational purposes. The internal consistency reliability is $\alpha = 0.745$.

4.4 Teacher Engagement Scale
Teacher Engagement is assessed with the help of a standardized scale developed by SoGo Survey. The scale consists of 8 items that measure attitude, dedication and feelings in a five point likert format where one corresponds to strongly disagree and five corresponds to strongly agree. High scores correspond to high level of Teacher Engagement. The internal consistency reliability is $\alpha = 0.922$.

4.5 Procedure
The questionnaire was administered to respondents at their workplace. The duration for questionnaire completion is 5 to 7 minutes. 350 questionnaires were distributed of which 332 were returned. 8 questionnaires were rejected as they were partially filled. 324 questionnaires were finally selected for the analysis.

4.6 Data Analysis
Simple regression analysis was used to test the significance of the relationship and impact of the level of ICT usage on teacher engagement. T-test and ANOVA were used to assess the differences in the level of ICT usage with regard to demographic variables.

5. Results

The various analyses used in the study include descriptive analyses, regression analyses, t-test analyses and ANOVA.

5.1 Demographic Characteristics of the Sample

The 324 sets of questionnaires were analysed for the respondent's characteristics and these have been summarized in the table 1 given below. Within the sample,143 respondents (44.1%) were males and 181 respondents (55.9%) were females. 179 respondents (55.2%) were employed in government institutions while 145 respondents (44.8%) in private institutions. 74 respondents (22.8%) were working for 2 to 4 hours per week, 72 respondents (22.2%) were working for 5 to 7 hours per week and 178 respondents (54.9%) were working for 8 or more hours per week. 84 respondents (25.9%) had been using computers/internet at any institute for less than 3 years and 166 respondents (51.2%) had been using computers/internet for more than 6 years. 99 respondents (30.9%) were teaching graduate courses while 225 respondents (69.4%) were teaching postgraduate courses. 71 respondents (21.9%) were teaching Humanities subjects, 74 respondents (22.8%) were teaching Science subjects and 179 respondents (55.2%) were teaching Management subjects.

Table 1: Respondent's Characteristics (N=324)

Demographic Variables	*Sub-categories*	*Frequency*	*Percentage*
Gender	Male	143	44.1%
	Female	181	55.9%
Ownership	Government	179	55.2%
	Private	145	44.8%
Working Hours per week	2 – 4 hours	74	22.8%
	5 – 7 hours	72	22.2%
	8 or more hours	178	54.9%
Number of years having used computers/internet at any institute	Less than 3 year	84	25.9%
	Between 4 to 6 years	74	22.8%
	More than 6 years	166	51.2%
Class taught	Graduate Postgraduate	99 225	30.6% 69.4%
Subjects taught	Humanities	71	21.9%
	Science	74	22.8%
	Management	179	55.2%

5.2 Descriptive Analyses
Table 2 below shows the means and standard deviations of the variables under study. The mean score for level of ICT usage is 39.49 (S.D. = 6.71). This score indicates that most of the respondents make use of ICT for educational purposes.

Respectively, the analysis of the Teacher engagement responses for all respondents indicates that the mean score of engagement among teachers is 34.92 (S.D. = 5.45). This indicates the level of engagement among teachers in higher educational institutions under study is above average.

Table 2: Mean and Standard Deviation among the variables

Variable	Mean	SD
ICT usage	39.49	6.71
Teacher engagement	34.92	5.45

5.3 Regression Analysis

This study presents the simple regression analysis to indicate that level of ICT usage is a significant predictor of teacher engagement.

5.3.1 ICT Usage and Teacher Engagement

The first hypothesis in this study states that there is significant relationship between the level of ICT usage and teacher engagement. Results as shown in table 3 indicated that ICT usage predicts teacher engagement, $\beta = 0.311$, $S_\beta = .043$, $t = 5.865$, $p < 0.01$. It was found that ICT usage and teacher engagement are positively correlated.

Table 3: Correlation coefficient, R square, Standardized Beta Coefficients, Standard Error and t for Paths from ICT usage to Teacher engagement

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Dependent variable	**Predictor variable**	**B**	**Std. Error**	**β**		
Teacher engagement	ICT usage	0.252	0.043	0.311	5.865	.000
F = 34.399	R = 0.311			$R^2 = 0.097$		

5.4 T-test Analyses

This study presents the t-test analyses to examine the differences in the level of ICT usage with regard to demographic variables i.e. teachers' gender, ownership of institution and class taught.

5.4.1 ICT Usage and Gender

The second hypothesis in this study states that there is a significant difference among the male and female teachers with regard to their level of ICT usage. Table 4 below shows the mean and SD values for ICT usage scores of male and female teachers. It was indicated that the differences between male and female teachers regarding ICT usage were not significant. ($t = -0.236$, $p > 0.01$).

Table 4: Mean of ICT usage, SD, t and p values by Gender (N=324)

Gender	N	Mean	SD	T	P
Male	143	39.39	6.85	-0.236	.814
Female	181	39.56	6.61		

5.4.2 ICT Usage and Ownership

The third hypothesis in this study states that there is a significant difference among the teachers employed in government and private institutions with regard to their level of ICT usage. Table 5 below shows the mean and SD values for ICT usage scores of government and private institution teachers. It was indicated that the differences between teachers serving in government and private higher educational institutions under study with regard to level of ICT usage were not significant. ($t = -0.047$, $p > 0.01$).

Table 5: Mean of ICT usage, SD, t and p values by Ownership (N=324)

Ownership	N	Mean	SD	T	P
Government	179	39.47	6.76	-0.047	.962
Private	145	39.51	6.66		

5.4.3 ICT Usage and Class taught

The fourth hypothesis in this study states that there is a significant difference among the teachers teaching graduate and postgraduate courses with regard to their level of ICT usage. Table 6 below shows the mean and SD values for ICT scores of graduate and postgraduate teachers.

It was indicated that the differences between graduate and postgraduate teachers with regard to level of ICT usage were not significant. ($t = -1.343$, $p > 0.01$).

Table 6: Mean of ICT usage, SD, t and p values by Class taught (N=324)

Class taught	N	Mean	SD	T	P
Graduate	99	39.16	6.72	-1.343	.181
Postgraduate	225	40.24	6.66		

5.5 ANOVA

This study presents the ANOVA to examine the differences in the level of ICT usage among teachers with regard to demographic variables i.e. number of years having used computers/internet at any institute, working hours per week and subjects taught.

5.5.1 ICT Usage and Number of Years having used computers/internet at any institute

The fifth hypothesis in the study states that there is a significant difference in the level of ICT usage with regard to number of years having used computers/internet. Table 7 below shows the mean, SD and F values for ICT usage by number of years having used computers/internet. Results found that there were no significant differences in the level of ICT usage with regard to the number of years having used computers/internet at any institute. ($F = 0.022$, $p > 0.01$)

Table 7: Mean of ICT usage, SD, F and p values by number of years having used computers/internet at any institute (N=324)

Number of years having used computers/internet	N	Mean	SD	F	P
Less than 3 year	84	39.44	6.23	0.022	0.978
Between 4 to 6 years	74	39.63	7.90		
More than 6 years	166	39.45	6.40		
Total	**324**	**39.49**	**6.71**		

5.5.2 ICT Usage and Working hours per week

The sixth hypothesis in the study states that there is a significant difference in the level of ICT usage with regard to working hours per week. Table 8 below shows the mean, SD and F values for ICT usage by working hours per week. Results found that there were significant

differences in the level of ICT usage with regard to working hours per week (F = 14.697, p <0.01). It was found that those who taught for 2 – 4 hours per week used ICT the most for educational purposes, followed by those teaching for 5 – 7 hours per week and more than 8 hours per week.

Table 8: Mean of ICT usage, SD, F and p values by working hours per week (N=324)

Working hours per week	N	Mean	SD	F	Sig.
2 – 4 hours	74	42.52	6.25	14.697	0.000
5 – 7 hours	72	40.41	5.71		
8 or more hours	178	37.85	6.78		
Total	**324**	**39.49**	**6.71**		

5.5.3 ICT Usage and Subject taught

The seventh hypothesis in the study states that there is a significant difference in the level of ICT usage with regard to subject taught. Table 9 below shows the mean, SD and F values for ICT usage by subject taught. Results found that there were significant differences in the level of ICT usage with regard to subjects taught (F = 59.83, p < 0.01) It was found that teachers of management subjects used ICT the most for educational purposes followed by Humanities and Science.

Table 9: Mean of ICT usage, SD, F and p values by subject taught (N=324)

Class taught	N	Mean	SD	F	Sig.
Humanities	71	37.61	9.52	59.83	0.000
Science	74	34.12	4.72		
Management	179	42.45	3.83		
Total	**324**	**39.49**	**6.71**		

6. Discussion and Conclusion

The purposes of the present research were to explore the relationship among ICT usage and teacher engagement and to study the differences in the level of ICT usage among teachers in higher educational institutions under study with regard to demographic variables.

Hypothesis 1 in this study was supported, as there was a significant impact of level of ICT usage on teacher engagement. The results indicated that there was a significant positive relation of ICT usage with teacher engagement. Thus, teachers who used ICT for educational purposes more were found to be more engaged to their careers.

Hypothesis 2 stating that ICT usage would vary among male and female teachers was not supported by the findings. Thus it can be concluded based on this finding that male and female teachers are equally proficient and well-versed in the educational applications of ICT.

Hypothesis 3 stating that there are significant differences in level of ICT usage among teachers employed in government and private higher educational institutions was not supported by the findings. This could be attributed to the fact that most of the higher educational institutions in India have adequate ICT infrastructure. Thus, there exists no technological divide among respondents from government and private institutions with regard to ICT usage.

Hypothesis 4 in this study was not supported, as there was no significant difference between teachers teaching graduate and postgraduate courses with regard to the use of ICT for educational purposes.

Hypothesis 5 stating that there were no significant differences in level of ICT usage with regard to number of years having used computers/internet at any institute was also not supported. This could be attributed to the fact that ICT usage for educational purposes is a function of the course structure rather than one's previous experience with ICT.

In line with hypothesis 6, it was found that there were significant differences in the level of ICT usage with regard to the working hours per week. The results indicated that those who taught for 2-4 hours per week used ICT the most followed by those who taught for 5-7 hours per week and more than 8 hours per week.

Hypothesis 7 stating that level of ICT usage among teachers varies with regard to the subject taught was supported. It was found that Management teachers used ICT for educational purposes the most followed by Humanities and Science teachers. A plausible explanation could be that management institutes compete for high-quality students by offering latest gadgets such as laptops, Wi-Fi enabled campuses and computer literate teachers whereas such competition is lacking in other institutes.

7. Implication of the Study

This study presents empirical findings on positive relationship of level of ICT usage and teacher engagement. Teachers with higher engagement are efficient, effective, creative and more aligned with the organizational goals and objectives. There are several implications for this study. Firstly, since ICT usage enhances teacher engagement, the management of the higher educational institutions must facilitate ICT infrastructure and its use for educational purposes. Secondly, the teachers must be trained in the use of ICT and its applications in teaching. There is a need to educate teachers about how ICT can enhance their efficiency and creativity by making learning more exciting for students as well as themselves. Thirdly, the management must create a culture that encourages ICT usage such as use of information systems in institutes where teachers are able to communicate with their students, supervisors and management using a common ICT platform. Fourthly, higher educational institutions are in dire need of IT officers who can handle the ICT infrastructure and related equipment in the institute. Recruiting such officers is essential in order to upgrade the institutes. Fifthly, Computer literacy can be made a criterion for recruitment as a teacher in any institute. Sixthly, Institutes can enter into strategic partnerships with IT companies that train teachers in the pedagogical uses of ICT. Seventhly, collaborative learning can take place among institutes where faculty members visit other hi-tech institutes to learn about the latest ICT practices being

followed for teaching purposes. Lastly, workshops and seminars must be conducted where teachers are briefed about the latest ICT practices being followed in other institutes in developed countries.

8. Limitations & Recommendations

There are several limitations as well as recommendations to this study. Firstly, the sample size is small. It is therefore suggested for future research to increase the number of respondents. Secondly, the sample of the present study includes only teachers in north India, so the findings of the present study cannot be generalized to other geographical regions. Thirdly, there is possibility of respondent error since the questionnaires were administered during work hours. There is a tendency among respondents to give answers that are socially acceptable. Thus, genuine responses may not have been captured by the self-rating questionnaires. This limitation can be overcome through the use of 360 degree feedback from students, supervisors and staff members. Fourthly, studies regarding the barriers to the use of ICT could be conducted in order to address the issue of technological divide in India. Lastly, this study is cross-sectional in nature; thus further research using longitudinal studies needs to be conducted to confirm the results.

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