

Factors persuading school teachers' acceptance of Information and Communication Technology (ICT) in pedagogy

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Abstract: The ICTs (Information and Communication Technologies) have enormous potential to transform the academic sphere with innovations. Every step of humanity is backed and anchored by technology hence it is mandatory to have its inclusion in academic sector too where mere learning of technology changed to learning with technology. Last three decades witnessed a technological revolution in the academic sector. Studies proved that teachers are the most important school-related factor that influence students' learning hence it is mandatory to evaluate the factors which influence a teacher to accept or reject technology in academics. This study reviewed teachers' attitude and perceptions regarding technology-mediated academic practices and identified the crucial factors that persuade their acceptance of ICT. They are Demographic factors, Teachers' attitude, self-efficacy, enjoyment, interactivity, management support, training, ease of use and usefulness. Based on these factors identified from the reviews, the researchers also conducted semi-structured interviews with school teachers with a sample size of 30 and evaluated its practical implication in the present scenario. The study was conducted in Coimbatore District, Tamilnadu. The study identified a significant correlation between the factors identified through the reviews and the response extracted from the samples.

Keywords — *Attitude, Ease of use, ICT, Self Efficacy, Training, Usefulness, Management Support*

I. INTRODUCTION

The technology medicated education has changed the pattern and pace of information diffusion worldwide. The ICT (Information and Communication Technology) supported academic activities have become frequent in all stages of education. Studies show the importance of technology induction in academics and its requirement in every curricular practice. Like any other country, India too highly relies on the potentials of technology to build its knowledge society.

The Government has taken many efforts to upgrade the standards of teaching and learning in the country [1]. A recent decisive initiative by the Government of India was 'The digital India Program' commenced on July 1, 2015, as a flagship line up to empower the country digitally and to facilitate in bridging the rural-urban digital divide. It also emphasises to provide reliable and durable network connectivity to every citizen thus opening the doors of unending avenues in every sector, especially in the education sector.

The Central Government and other State Governments have taken a large number of schemes to build and transform the academic sector into a more charismatic and efficient quarter with the support of technology. It started the initiatives right

from 1984 with CLASS- Computer Literacy and Studies in Schools (1984-85). Other few key initiatives were National IT Task Force (1998), National Curriculum Framework (2005), The Sixth Five Year Plan (1975-80), Rashtriya Madhyamik Shiksha Abhiyan- RMSA (2009), National Conference on Integrating Technology into Teaching Learning (2002), National Teacher Platform, CIET, and SIET. It is to be noted that both the state and central governments have provided ample financial support to educational institutions in the country to enhance learning with the support of technology and to upgrade the standards of education. Like any other states, Tamilnadu also spent on par with the requirement from the academia.

II. BACKGROUND OF THE STUDY

This study has two major segments. Section one is to identify the crucial factors that determine school teachers' acceptance or rejection of technology-mediated instructional practices. For this, the researchers adopted thematic analysis by going through the existing reviews. In the second segment, the study deals with a semi-structured interview that was developed with the support of the factors elicited through the reviews. The researcher analysed a handful of reviews for the same. For the semi-structured interview, the researchers approached 30 school teachers in Coimbatore

district who are working in both government and the private sector. In Tamilnadu state, Coimbatore district is identified as the educational hub of South India where a large number of schools and internationally recognized higher educational institutions are functioning. Following are the factors

identified through the reviews which influence teachers' acceptance of Information and Communication technology in academics; Demographic Factors, Teachers' attitude, Self Efficacy, Enjoyment, Interactivity, Management Support, Training, Ease of Use and Usefulness (Table 1).

Sl.no	Factors	Reviewer and Year
1.	Demographic factors	Afshari, Bakar, Luan, Samah, & Fooi (2009) Baek, Jong, & Kim (2008), Basargekar & Singhavi (2017), Basargekar & Singhavi (2017), Khan, Hasan, & Clement, (2012), Kumar, Rose, & D'Siiva (2008), Lau & Sim (2008), Noh, Hamzah, & Abdullah (2009), Proctor, Burnett, Finger, & Watson (2006), Ramos (2005), Schiler (2003), Volman, Eck, Heemskerck, & Kuiper (2005), Wachiuri (2015), Wong (2002)
2.	Teachers' attitude	Aydin, Semerci, & Gurol, (2016), Ertmer P (2005) , Goos, Galbraith, Renshaw, & Geiger (2003), Mohd Ayub, Bakar, & Ismail (2015), Russel, Bebell, O'Dwyer, & O'Connor (2003) Sanchez, Marcos, Gonzales, & GuanLin (2012)
3.	Self efficacy	Bandura & Adams (1977), Bandura (2006), Bandura, (1993), Benight & Bandura (2004), Robertson & Al-Zahrani (2012), Schunk & Pajares (1995), Yamamoto (2016), Yamamoto & Yamaguchi (2016)
4.	Enjoyment	Davis, Bagozzi, & Warshaw (1989), Cox, Preston, & Cox (1999), Fred Davis (1993), Roberts, McNeese, & Thornton (2007), Isiyaku, Mohd Ayub, & Abdulkadir (2015), Venkatesh & Bala (2008), Ajuwon & Popoola (2015), Kroenung et.al (2015), Robertson & Al-Zahrani (2012), Teo & Noyes (2011), Yamamoto (2016), Ahmad, Kamba, & Usman (2012), Maharaj-Sharma & Sharma (2017)
5.	Interactivity	Alarcia & Bravo (2012), Dillenbourg (1999), Jorczak & Bart (2009), Moore (1989), Rosa (2016), Salinas(2004), Salovaara & Jarvela (2003), Sher (2009), Shivers (2009), Tanveer (2011), Wang (2008)
6.	Management Support	Ertmer (1999), Ayub, Bakar, & Ismail (2015), Korte & Husing (2007) Becta (2004), Charles (2012), Mulkeen (2003), Pelgrum (1993), Serhan (2007), Tondeur <i>et al.</i> (2008), Polizzi (2011)
7.	Training	Borko (2004), Galanouli, Murphy, & Gardner, (2003), García, Marcos, GuanLin, & Escribano, (2013), Gay (1997), Giavrimis (2011), Sanchez et. al (2012), Sime & Priestley, 2005)
8.	Ease of Use	Ajjan & Hartshorne (2008), Aypay, Çelik, & Aypay (2012), Choudrie & Dwivedi (2005), Elkaseh <i>et al.</i> (2016), Fagan, Neill, & Wooldridge (2008), Fred Davis (1989), Moses, Wong, Bakar, & Mahmud (2013), Nair & Das (2012), Ogunniyi & George (2016), Rosen & Well (1995)
9.	Usefulness	Ajjan & Hartshorne (2008), Nair & Das, (2012), Ogunniyi & George (2016), Elkaseh, Wong, & Fung (2016), Kinik (2015), Fred Davis (1989), Hassan (2011), Sharma & Sharma (2017)

Table1: Factors influencing teacher's acceptance of ICT in academics

III. FACTORS INFLUENCING SCHOOL TEACHERS' ICT ACCEPTANCE

The reviews of related literature (Table 1) identified the crucial factors which influence teachers' acceptance of Information and Communication Technology-mediated pedagogical practices.

A. DEMOGRAPHIC FACTORS

Researchers have pointed out the crucial demographic factors which will influence an individual's perceptions towards the acceptance of an information system. Studies prove that demographic factors such as their gender, age, academic background, work experience, technical proficiency etc. will have a significant influence on his or her receipt of technology in their workplace. The researches proved that there is a significant correlation between teachers' gender and their attitude towards the acceptance or rejection of technology [2][3]. Studies proved that women express a lesser amount of acceptance when compared to men in acquiring technical skills and competence [4]. Teachers' academic qualifications are identified as another crucial demographic variable in

determining their acceptance of technology [5]. Their regular academic routine and workload stand as another factor in the acceptance of technology integration by teachers [6].

Studies identified the languages that a teacher uses in his or her classroom will also have a significant correlation towards their acceptance or rejection of technology as the majority of the features of technology-mediated academic practices are linked to the English language, hence the teachers who are not proficient in English will not prefer ICT mediated classes. The absence of content in regional languages poses threat to ICT integration in academics [7] [8]. Teachers' years of academic expertise is another factor which predicts their acceptance of technology and it also frames the attitude of an individual towards the inclusion of technology [9]. Some reviewers are of the opinion that there is no connectivity between the professional experience of teachers and their acceptance of technology [10]. They argue that there is a negative affiliation between teachers' years of professional experience in building a pro attitude and technology acceptance.

B. ATTITUDE

Teachers' attitude plays a crucial role in their technology acceptance. Reviews reiterate this argument saying that the only possibility to identify teachers' behaviour on technology integration is to study their attitude on the same [11] [12]. Any prospect of technology integration in academics should have a strong base by knowing its primary users' attitude on the same. Hence it is crucial to examine teachers' attitudes and beliefs on technology in academics as they are going to be the primary users [13]. Studies also point out teachers' both positive and negative inclinations, technical skills, the ambiance of the school, admittance to technology, the support of the school administrations and years of academic expertise will have significant influence in formulating teachers' attitude towards technology integration in academics [14] [15].

C. SELF EFFICACY

Self-efficacy is defined to be one's technical expertise/potential on technology use and perceived self-efficacy refers to one's own perceptions towards their skill in handling that technology. Self-efficacy is referred to a major component in studying the acceptance of technology by academicians in schools [16]. Studies prove that self-efficacy can be a motivational factor and thus influencing the behaviour of an individual or a group of individuals [17]. The efficiency of an individual in completing the tasks can be measured by their set targets and efforts inducted and those people with efficiency will have a higher amount of self-efficacy. Such people with self-efficacy will be flexible and supple to failures. Studies [18] prove that teachers' inclusion of their technology in academics and their self-efficacy is correlated. It is also observed that higher the amount of self-efficacy will result in the high chance of technology integration in the profession. Another set of researchers [19] studied the influence of a teachers' self-efficacy in their students' academic performance and they proved that teachers' self-efficacy will significantly influence their students' academic gains. The study also says it can lend a hand to the students who are differently abled or with learning disabilities.

D. ENJOYMENT

Researches [20] identify Perceived enjoyment (PEN) as the degree to which the act of using technology seems to be enjoyable. Studies reiterate that teachers' enjoyment of using technology could power teachers' use of technology by and large in the classroom. Studies also [21] pointed out the motivational factors which are associated with teachers' use of technology in curricular practices and one among the key factor identified was teachers' enjoyment. Researchers [22] state that the educators and the learners who are a part of technology-supported learning environments exhibit high echelon of enjoyment. Another study [23] established the

notion teachers' perception of enjoyment in a more passable manner by saying perceived enjoyment of technology will influence teachers' act of integrating technology into academics and also significantly influence their behaviour. Studies also [24] say that developing an enjoyable work sphere for teachers will facilitate them to create effective learning ambiance and thus enabling the learners to achieve more.

E. INTERACTIVITY

Interactivity is a major factor in an academic setup. This becomes more reasonable with regard to the technology integration in academia as technology provides ample support to interactivity compared to other means of education [25]. Studies [26] state that the teachers and the students have the tendency to interact more when technology is used in their routine. This aspect of interaction will support the students to obtain expertise and knowledge in a more comprehensive manner. Researchers [27] identified that teachers prefer to integrate technology when they are able to receive real-time interaction and technology is expanded adequately [28] to provide sufficient real-time interaction with its user. Researchers [29] suggest a change in approach and methodology in ICT integrated classes to enhance more interaction other than merely using technology as a means of teaching. This interaction is not only limited to classrooms but also expanded beyond the four walls by enhancing virtual learning environment by the teachers and the students. This approach will develop an active involvement by its users in learning procedure [30].

F. MANAGEMENT SUPPORT

The productive execution of any plan or project is conclusively dependent on its administrative decisions and this basic notion is applicable in school administration as well [31]. School's culture and its administrative support are the key factors that influence in developing favorable or unfavorable attitude among teachers towards their acceptance or rejection of technology-mediated instructional practices. [32]. It is identified that school management and administrators are the responsible groups to provide sufficient technical gadgets for pedagogical practices. If they neglect this initiative, this may lead to teachers' rejection of technology in their academic practices [33]. The policymakers and the management can ensure and enhance the utility of technology by its teachers in their classes. They must be technically trained and self-reliant to integrate technology into their academics [34].

G. TRAINING

Studies [35] [36] state that teachers do hold a constructive perspective towards training in education as training will enhance quality in education. Teachers do insist upon

training that it must be in accordance with the curricular needs of the society. It is also observed that teacher educators possess a highly optimistic attitude towards teacher training in ICT as its an evolving sector in academics. It is also observed that effectual training in ICT mediated academics will transform the nature of an academician [37]. Another researcher [38] evaluate the training in traditional teacher preparation sessions do not have a valid role in determining and developing a positive attitude towards ICT inclusion. So it is to be noted that traditional teacher training programs have to be upgraded to handle technology-mediated classes. Studies [39] prove that effective training has turned out to be a measurement factor to scale teachers confidence in technology integration.

H. EASE OF USE

Ease of use is defined as the extent to which an individual predicts the easiness of utilizing an information system. They also assume that its usage will be effortless [40]. The researchers [41] [42] point out that in every research which evaluates teachers' acceptance of Information and Communication Technology in academics must necessarily appraise and evaluate their perceived ease of use of technology. It is also observed that using a particular information system consistently in the academic sector will be a key factor in developing teachers' perceived ease of use of technology. Another valid observation [43] states that perceived ease of use is a motivational factor. The teachers' regular use of technology is a critical factor in determining their inculcation of technology into their daily pedagogy [44]. Other factors which influence teachers' perceived ease of use of technology are lack of technology training, the absence of ICT in curriculum, improper judgment towards technology in academics [45].

I. USEFULNESS

Researchers [46] defined perceived usefulness as a belief and acceptance of an individual in using a technical system would enhance his or her job performance. Perceived usefulness is a certainty on technology utility and it has a significant relation with user's job performance. It is observed that usefulness of technology has a significant influence on building professionalism among teachers and it may also be influencing teachers' attitude towards technology acceptance in academics [47]. Reviews [48] reiterate that perceived usefulness is the most dominant factor in the researches that study teachers' acceptance of technology in their academic routine.

IV. KEY FINDINGS: INTERVIEW SCHEDULE

The research evaluated the applicability of these constructs picked from the reviews to the academic sphere in Coimbatore District. The researchers conducted detailed discussions on their perceptions of and attitudes towards the inclusion of technology. The entire discussion was based on

the 9 constructs spotted from the reviews. The researcher conducted semi-structured interviews with 30 school teachers from Coimbatore district, based on the factors identified through the reviews. The teachers took part in the interview are working in schools in Coimbatore district. 12 Men and 18 Women teachers were interviewed. The key findings from the interview schedule are given below

1. Demographic Factors

- a. Teachers' age do not have any influence towards their acceptance of ICT in academic activities.
- b. Teachers' gender has no significant influence on acceptance of technology.
- c. Teachers' years of teaching experience influence their attitude towards the acceptance of technology. The experienced teachers prefer chalk and board when compared to any other means of instruction while the young minds prefer technology in their routine but they also need chalk and board often.
- d. Teachers' academic proficiency and higher qualifications directly influence their acceptance of technology.
- e. Teachers who are proficient in English are more comfortable to integrate technology into academics.

2. ATTITUDE

- a. Teachers' possess a favorable and supportive attitude towards the utility of technology in academics
- b. Teachers are aware of the benefits of technology integration
- c. Teachers' attitude towards students use of technology is also supportive
- d. Teachers value their service and believe that technology can never replace a teacher
- e. The schools location also plays a key role in developing teachers' attitude.

3. SELF EFFICACY

- a. Most of the teachers are not confident towards their skills to integrate technology into academics.
- b. Some teachers are worried about their students' perceptions, if they commit mistakes before students while using technology.
- c. Out of thirty respondents four of them expressed their confidence in integrating technology in lectures. They also assured that they can deal any sort of technical glitches that may occur in technology mediated classes.

4. ENJOYMENT

- a. Teachers find ICT integration gives them happiness and job satisfaction.
- b. They feel accomplished if they use technology in their classes.

5. INTERACTIVITY

- a. Most of the respondents opined that technology mediated classes do not give a platform for proper interaction

- b. Some of them opined that the students are focused towards the contents displayed on screen, and it's a distraction
- c. Two teachers opined that students with less interactive skills may turn unnoticed

6. MANAGEMENT SUPPORT

- a. Most of the respondents agreed that management is one among the crucial factor in effective technology integration.
- b. Management support is mandatory in technology induction
- c. Few teachers opined that attitude of the principal/manager of the school is an important factor in technology integration.
- d. Teachers are willing to use technology but computers are not in working condition and take more time for reparation.

7. TRAINING

- a. Teachers believe that training is the crucial factor which influenced their use of technology
- b. Most of the respondents agreed to the point that their school management tries to give training in technology, but due to lack of planning and availability of resources, it goes in vein.
- c. The respondents do expect sufficient and effectual training in ICT

8. EASE OF USE

- a. The ease of use of technology is a key factor as most of the teachers are not proficient enough to handle them
- b. Teachers say, though they have less technology support at schools they try to include it in their lectures but finding lots of difficulties with regard to its use
- c. Some of the respondents opined that using a smart board is as equivalent to chalk and board. They also said sometimes it becomes more effective than chalk and board lectures.

9. USEFULNESS

- a. Teachers are convinced about the utility of technology in academics
- b. They believe that technology can enhance professionalism
- c. Few teachers are skeptic on the utility of technology in academics, as they assume that effective transmission of knowledge doesn't require an electronic gadget.

V. CONCLUSION

The findings can be categorised into different levels. Teacher level factors, Management level factors, and Technology level factors. Teacher level factors are their attitude, knowledge, and skills in integrating technology to academic activities. Management level factors are the provision of training and gadgets, building a tech-friendly campus etc. The technology level factors are the ease of use

of technology and its usefulness. This research gives an overall picture of technology integration in the academic sphere. The government takes initiatives to support the teachers and students to integrate technology in academics but due to lack of proper training and dearth of sufficient gadgets, it goes in vain. More than any other factors to be considered for technology integration the government/management/policymakers have to give more importance to train the teachers to use technology. It is also observed that training is required in two aspects. 1) Proper training to teachers how to use technology and 2) training for the students how to learn using technology. This will make a commendable change in the education sector and it will ensure and enhance quality in academia.

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