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Computer Attitude of Teachers in Relation to their Level of Instruction

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Abstract

ICT is not only the backbone of the Information Age, but also an important catalyst for inducing educational reforms that could transform students from passive recipients of knowledge to pioneers of the learning process. Today, technology is an integral learning tool for promoting the social, linguistic, and cognitive development of children of all ages. To achieve the goal of a technological revolution in education however, it is imperative that both teachers and students develop the necessary knowledge and skills sought in this digital age. The present descriptive research aimed to compare computer attitudes of teachers employed at different levels of instruction in an attempt to discern whether the curriculum and activities included at a particular teaching stage had any influence on their computer attitudes. The findings of the study revealed the fact that primary and secondary school teachers showed a significant difference in their computer attitudes, while those of schools and colleges were comparable in terms of each of the variables considered. These results could provide important implications for enhancing the curriculum across the different teaching stages in an attempt to bring about the necessary attitudinal changes in teachers toward the use of computers in a technology driven age.

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Keywords: Affect, perceived control (PC), perceived usefulness (PU), behavioural Intention (BI) and computer attitudes (CA).

In recent years, ICT has rapidly acquired a pivotal position in every walk of life. And it true for education also. The question is whether this development has the same meaning and consequences for all teachers. It is an accepted fact that teachers differ in their experience of and attitude toward ICT depending on a number of related factors. If the goal is to promote technology enhanced education, it is of primary importance to investigate what teachers perceive of technology and its use in education, what knowledge and skills they possess in this regard or what skills they need to further develop. Chai and Khine (2006) (as cited in Teo, Chai, Hung, and Lee, 2008) argue that teachers' technology use is influenced by factors which can be classified in two broad categories, external environmental factors and the personal teacher characteristics.

Sadýk (2006) in his study in Egypt reported that the more positive teachers' attitudes were toward technology, the more likely they were to integrate it in the classroom. A study carried out with university chemistry professors in the U.S. suggested that pedagogical content knowledge was a stronger predictor of technology

use rather than perceptions (Kahveci, Gilmer, and Southerland, 2008). Others found that beliefs about teaching influenced the way Singaporean pre-service teachers used technology in their classrooms (Teo et al., 2008). Various studies conducted in various settings continue to add to the literature on computer attitudes of teachers by rendering different perspectives on teacher characteristics, influential in technology use.

Pelgrum (2001) states that using computers could revolutionize an outmoded educational system, better prepare students for the information age and accelerate national development efforts. Cuban (2001) considers computers a vehicle for reforming educational practices, to be used as an instructional tool by teachers at all levels of education. McAllister and Mitchell (2002) add that using computers will make the learning process exciting for both students and teachers.

Roblyer and Edwards (2000) suggested that there are five important reasons for teachers to use technology in education: (1) motivation, (2) distinctive instructional abilities, (3) higher productivity of teachers, (4) essential skills for the Information Age, and (5) support for new teaching techniques (cited in, Samak, 2006). In order to use technology in the classroom effectively, teachers' attitude toward technology should be positive and they should be trained in using the modern technologies in the field of education. Chin and Hortin (1994) stated that the teacher clearly must act as the "change agent" in the relationship between technology and the student. Some educators argue that computers have little value in reforming education without teachers' involvement (McKinney, 1998; Galligan, 1995). According to Medlin (2001) and Surendra (2001), the accessibility and availability of computers was an important factor affecting the use of computers for instructional purposes. Rogers (2003) indicated that trial ability and observer ability are the two attributes of an innovation that might increase the rate of adoption of innovations. If teachers are aware of computer technologies and have an opportunity to access computers, their level of using technology in their courses might rise.

Developing teachers' computer skills requires changing their attitudes towards computers, because their application of technology in their classrooms is affected by their attitudes. Albion (2001) stressed that teachers' beliefs and attitudes towards computers are among the significant issues to be addressed. Watson (1998) asserts that developing teachers' positive attitudes towards computers is very important to ensure not only computer integration in the teaching-learning process, but also to avoid teacher resistance to use the computer in their classrooms.

Review of relevant literature also revealed that children of all ages today are surrounded by technology at home, in their community, and increasingly, in their education programs. Hence it follows that present day teachers need to be well versed in their know-how of technology so as to make digital learning an integral part of education. Teachers need to 'be the change they wish to see in education'. Technology is increasingly recognized as an integral learning tool for promoting the social, linguistic, and cognitive development of young children (Gimbert and Cristol, 2004; Information Society for Technology in Education [ISTE], 2007). Today, the question that educators need to ask is no longer about whether and to what extent technology should be used in the classroom, but rather how it should be used (Clements and Sarama, 2003). Keeping up with new technologies for the classroom presents an on-going challenge for educators (Clements and Sarama, 2002) as they recognize the ever developing potential of technologies to enhance the ability of children to learn, to solve problems, and to communicate their ideas. One of the key questions for teachers to consider is the role of new technology in the curriculum (Swaminathan and Wright, 2003).

There have been many studies that have highlighted the relationship of Computer Attitudes of teachers

with their age, gender and computer experience. However, the probability of their computer attitudes depending on the level of instruction at which they are employed remains an area unexplored. In the light of existing research literature on the importance of teachers' attitudes toward the use of information and communication technologies in education, the main aim of this study was to compare the Computer Attitudes of teachers working at different teaching stages.

Operational definition of the terms

The following terms were defined to clarify their use in the context of this study:

1. **Computer Attitudes:** It signifies the overall outlook and predisposition of teacher trainees to respond in a consistently favorable or unfavorable manner with respect to the use of computers in teaching.
2. **Affect:** It denotes teacher trainees' feelings towards using computers.
3. **Perceived Usefulness:** It refers to the degree to which a teacher trainee believes that using computers in teaching would enhance his or her job performance.
4. **Perceived Control:** It indicates the teacher trainees' perceived comfort level or difficulty in using computers.
5. **Behavioural Intention:** It denotes the apprehension of teacher trainees' when considering the implications of utilizing computer technology.
6. **Primary Section:** It refers to the first three or four grades of elementary school and sometimes kindergarten
7. **Secondary Section:** It indicates the final stage of schooling, known as secondary education and comprises of standards V to X. It follows elementary or primary education, and may be followed by university (tertiary) education.
8. **School:** It refers to an educational institution providing primary and secondary education and comprising of standards I to X.
9. **College:** It refers to an educational institution providing higher education or specialized training.

Aim of the study

The following was the broad aim of the study:

To compare the computer attitudes of teachers employed at different levels of instruction in relation to their:

(a) Affect

(b) Perceived Control

(c) Perceived Usefulness and

(d) Behavioural Intention

Objectives of the Study

The following were the specific objectives of the study:

1. To ascertain the difference in the Affect, Perceived Control, Perceived Usefulness, Behavioural Intention and Computer Attitudes of primary and secondary school teachers
2. To ascertain the difference in the Affect, Perceived Control, Perceived Usefulness, Behavioural Intention and Computer Attitudes of school and college teachers.

Hypotheses of the Study

The following null hypotheses were formulated for the study:

1. There is no significant difference in the Affect, Perceived Control, Perceived Usefulness, Behavioural Intention and Computer Attitudes of primary and secondary school teachers.
2. There is no significant difference in the Affect, Perceived Control, Perceived Usefulness, Behavioural Intention and Computer Attitudes of school and college teachers.

Methodology of the Study

The present investigation is a descriptive research as it involves collecting data using self-reporting tools to test hypotheses or answer questions concerning the current status of teachers employed at different levels of instruction with regards to their computer attitudes. It is also causal comparative as it attempts to discover any possible difference in the Affect, Perceived Control, Perceived Usefulness, Behavioural Intention and Computer Attitudes of teachers belonging to the different groups.

Sample

The incidental sampling technique was employed for the purpose of this study to select a sample which was conveniently available. The sample comprised of 4 groups of teachers, belonging to 4 different levels of instruction namely, Primary Section, Secondary Section, Schools and Colleges each comprising of 45 teachers employed at the specified level of instruction, from English medium educational institutions in Mumbai.

Tool

The Computer Attitude Scale (CAS) developed by Selwyn (1997) was used to measure the teachers' attitudes towards computer use. It is a 21-item questionnaire that consists of four components of computer attitudes. The first component, 'Affect', is composed of six items and measures feelings towards computers. 'Perceived Usefulness' is composed of five items that measure the individual's beliefs about the usefulness of computers in their job. 'Perceived Control', is composed of six items that measure the perceived comfort level or difficulty in using computers. The fourth component, 'Behavioural Intention', is composed of four items that measure behavioural intentions and actions with respect to computers. Participants responded to the CAS using a five-point scale of strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). The scores from the items on each component were aggregated to provide individual scores on each component. In this study, the negative items were reverse coded. The CAS has been found to be a reliable instrument to measure attitude towards computers among teacher education students. Goodstadt-Killoran (1999) reported that the CAS possessed high reliability (alpha = 0.90).

Data Collection

Having selected the tool, the researcher administered the scale to the teachers. The purpose of the study was also briefly conveyed to them. The detailed instructions for giving responses to the items of the tool were then explained and doubts clarified. After collection of data, the responses were quantified by assigning

scale values to the items and the scores were systematically organized to facilitate ease of tabulation. The tabulated data was then analysed using descriptive and inferential analysis.

Data Analysis

The statistical techniques used by the investigator for the descriptive analysis included measures of central tendency and measures of variability.

Descriptive analysis dealt with the description of the following variables:

1. Affect Scores (AS), Perceived Control Scores (PCS), Perceived Usefulness Scores (PUS), Behavioural Intention Scores (BIS) and Computer Attitude Scores (CAS) of primary, secondary, school and college teachers.
2. The magnitude of the variables included in the study to show the extent of Affect, Perceived Control (PC), Perceived Usefulness (PU), Behavioural Intention (BI) and Computer Attitudes (CA) of primary, secondary, school and college teachers.

Descriptive analysis of the Variables

Table 1 shows the measures of central tendency namely, mean, median and mode and measures of variability namely, SD, skewness and kurtosis of Affect Scores (AS), Perceived Control Scores (PCS), Perceived Usefulness Scores (PUS), Behavioural Intention Scores (BIS) and Computer Attitude Scores (CAS) of primary and secondary school teachers.

Table 1: Descriptive statistics of the AS, PCS, PUS, BIS and CAS of Primary and Secondary School Teachers

Variable	Group	Mean	Median	Mode	Standard deviation	Skewness	Kurtosis
AS	Primary	24.09	25	26	3.67	-0.40	-0.53
	Secondary	21.31	21	21	4.15	-0.10	-0.29
PCS	Primary	20.66	21	22	2.08	-0.79	-0.004
	Secondary	19.47	20	19	2.40	-0.20	-0.49
PUS	Primary	17.11	17	15	2.99	-0.23	0.93
	Secondary	15.56	16	16	2.94	-0.02	2.25
BIS	Primary	14.11	14	14	3.08	-0.44	-0.27
	Secondary	13.13	13	12	2.95	-0.13	-0.37
CAS	Primary	75.98	77	83	9.55	-0.52	-0.69
	Secondary	69.47	70	65	9.35	-0.01	1.66

From Table 1 it can be observed that the mean, median and mode are in the ascending order only in the case of AS, PCS and CAS of teachers of the primary section and PUS of teachers of the secondary section and in the descending order for AS and BIS of teachers of the secondary section and PUS and BIS of teachers of the primary section. For all the other variables in teachers of both sections no uniform trend is observed. The distribution is negatively skewed for all the variables in both the groups of teachers. The kurtosis for PUS in both primary and secondary section teachers and that of CAS of secondary section teachers is platykurtic, while in the case of the other variables for both groups of teachers it is leptokurtic. Table 2 shows the magnitude of the variables of primary and secondary school teachers.

Table 2: Magnitude of the Variables of theStudy for Primary and Secondary School Teachers

Variable	Group	Mean	Percent Mean	Magnitude
Affect	Primary	24.09	75.37	SUBSTANTIAL
	Secondary	21.31	63.79	SUBSTANTIAL
PerceivedControl	Primary	20.66	46.29	MODERATE
	Secondary	19.47	56.08	MODERATE
Perceived Usefulness	Primary	17.11	60.55	MODERATE
	Secondary	15.56	52.75	MODERATE
Behavioural Intention	Primary	14.11	63.18	SUBSTANTIAL
	Secondary	13.13	56.06	MODERATE
Computer Attitude	Primary	75.98	59.94	MODERATE
	Secondary	69.47	50.3	MODERATE

Discussion

The findings in Table 2 indicate that the magnitude of Affect is substantial in case of teachers of both sections as well as in case of BI of teachers of the primary section, while that of all the other variables of teachers of both the sections namely, primary and secondary is moderate.

Table 3 shows the measures of central tendency namely, mean, median and mode and measures of variability namely, SD, skewness and kurtosis of Affect Scores (AS), Perceived Control Scores (PCS), Perceived Usefulness Scores (PUS), Behavioural Intention Scores (BIS) and Computer Attitude Scores (CAS) of school and college teachers.

Table 3: Descriptive statistics of the AS, PCS, PUS, BIS and CAS of School, College and Teachers

Variable	Group	Mean	Median	Mode	Standard deviation	Skewness	Kurtosis
AS	School	24.00	24.00	24.00	3.74	-0.51	-0.46
	College	23.22	24.00	24.00	4.25	-0.62	-0.35
PCS	School	20.73	20.00	20.00	3.00	0.24	0.04
	College	20.96	21.00	20.00	2.64	0.18	-0.12
PUS	School	16.02	16.00	16.00	2.90	-0.41	0.65
	College	16.18	16.00	14.00	3.57	0.19	-0.56
BIS	School	14.09	14.00	13.00	3.36	-0.09	-0.76
	College	14.07	15.00	12.00	3.79	0.39	-0.36
CAS	School	73.73	75.00	63.00	13.34	-1.64	5.21
	College	73.98	75.00	77.00	11.44	-0.26	-0.31

From Table 3 it can be observed that the mean, median and mode are in the ascending order only in the case of AS and CAS of college teachers, in the descending order for PCS and BIS of school teachers and PUS of school and college teachers. For all the other variables in teachers of both groups no uniform trend is observed. The distribution is positively skewed in the case of PCS of both groups and PUS and BIS of college teachers and negatively skewed for all the remaining variables in both the groups of teachers. The kurtosis for PUS and CAS of school teachers is platykurtic, while in the case of the other variables for both

groups of teachers it is leptokurtic. Table 4 shows the magnitude of the variables of school and college teachers.

Table 4: Magnitude of the variables of the study for school and college Teachers

Variable	Group	Mean	Percent Maen	Magnitude
Affect	School	24.00	75.00	SUBSTANTIAL
	College	23.22	72.00	SUBSTANTIAL
Perceived control	School	20.73	61.00	SUBSTANTIAL
	College	20.96	62.00	SUBSTANTIAL
Perceived usefulnes	School	16.02	55.00	MODERATE
	College	16.18	56.00	MODERATE
Behavioural Intention	School	14.09	63.00	SUBSTANTIAL
	College	14.07	63.00	SUBSTANTIAL
Computer Attitudes	School	73.73	46.83	MODERATE
	College	73.98	49.93	MODERATE

Discussion

The findings in Table 4 indicate that the magnitude of Perceived Usefulness and Computer Attitudes of school and college teachers is moderate, while that of all the other variables of teachers of both the groups namely, school and college is substantial.

The study involves the following inferential statistical techniques for testing of the null hypotheses:

1. Student's t-test

Testing Hypothesis 1:

The null hypothesis states that there is no significant difference in the scores of Affect, Perceived Control (PC), Perceived Usefulness (PU), Behavioural Intention (BI) and Computer Attitudes (CA) of primary and secondary school teachers.

Table 5 shows the relevant statistics of the scores of Affect, PC, PU, BI and CA of primary and secondary school teachers.

Interpretation of't': The obtained t-ratios for Affect and Computer Attitudes are 3.37 and 3.27 respectively which are greater than 2.71. Thus 't' is significant for Affect and CA at 0.01 level. The null hypotheses for these mentioned variables are, therefore, rejected. The obtained't' ratios for PC and PU are 2.53 and 2.48 respectively which are greater than 2.02. Thus 't' is significant for PC and PU at 0.05 level. The null hypotheses for these mentioned variables are, therefore, rejected. However, the obtained 't' ratio for BI is 1.54 which is less than 2.02. Hence, the difference is not significant for BI at 0.05 level. The null hypothesis for this variable is, therefore, accepted. Further, the mean scores of all the variables are higher in the case of primary school teachers.

Table 5: Relevant and statistics

Variable	Group (In terms of level of instruction)	Number of teachers	Mean	SD	t-ratio	Level of significance	100 ω estimate
AFFECT	Primary	45	24.09	3.67	3.37	0.01	10.32
	Secondary	45	21.31	4.15			
PC	Primary	45	20.67	2.08	2.53	0.05	5.66
	Secondary	45	19.47	2.40			
PU	Primary	45	17.11	2.99	2.48	0.05	5.41
	Secondary	45	15.56	2.94			
BI	Primary	45	14.11	3.08	1.54	N.S	1.50
	Secondary	45	13.13	2.95			
CA	Primary	45	75.98	9.55	3.27	0.01	9.72
	Secondary	45	69.47	9.35			

The tabulated values for't' are as follows (Garett, 1985):
For df = 43, t at 0.05 level = 2.02
Similarly, for df = 43, t at 0.01 level = 2.71

Findings

There is a significant difference in the Affect, PC, PU and CA of primary and secondary school teachers. The level of significance is 0.01 in the case of Affect and CA and 0.05 in the case of PC and PU. However, the BI of the two groups of teachers does not differ significantly.

Discussion

The results show that there were significant differences in primary and secondary school teachers' attitudes towards using computers in teaching, with the primary teachers exhibiting higher mean scores on all the variables. The underlying explanation for this finding could be that early childhood is the period of life from birth through age 8 years (Copple and Bredekamp, 2009), when growth and development are rapid. During that time, many children attend preschool and primary school, where they have access to technology as a learning tool. Further, Arrowood and Overall (2004) found that using computers improved the motivation of young elementary children in the writing process. Other studies reach similar conclusions, reporting that the motivation and engagement of kindergarten and primary-aged children in learning increased through the use of computers compared with non-computer-related learning activities (Chung and Walsh, 2006; Schmid, Miodrag, and DiFrancesco, 2008). The effects of technology in educational settings on the development of young children have been widely documented and strongly positive. For example, children who use computers have been found to show greater gains in intelligence, structural knowledge, problem solving, and language skills compared with those who do not use technology in their learning (Clements and Samara, 2003; Swaminathan and Wright, 2003; Vernadakis et al., 2005). The potential gains for primary children are tremendous, including improved motor skills, enhanced mathematical thinking, increased creativity, higher scores on tests of critical thinking, higher levels of what Nastasi and Clements (1994) term effectance motivation (the belief that they can change or affect their environment), and increased scores on standardized language assessments. In addition, computers enhance children's self-concept, and children demonstrate increasing levels of spoken communication and cooperation. This explains why primary school teachers possess a more

positive attitude to the use of computers in the teaching-learning process, as they use the computer for a host of learning activities. They resort to the use of CAI modules to present pictures and sounds to support the natural ways that young children learn so as to enhance their imagination of abstract concepts, making them more concrete and easily understandable. Besides, teachers assess young children's learning through careful examination of documentation of their work, including photographs, video clips, anecdotal records of children's experiences, and authentic work samples, such as drawings and paintings. It is evident that the computer would simplify the task of evaluation for teachers employed at this level. In a developing country like India, it is possible that most primary schools in the urban areas, being un-aided, charge higher fees and can hence afford to incorporate the use of technology based learning actively so as to enhance the quality of education provided at this level. Hence, teachers of primary schools are suitably trained so as to be both confident in terms of technical know-how and expertise which probably explains their higher mean scores on each variable. It is only when teachers are adequately trained that computers can be an effective teaching tool. The challenge in early education thus lies in discovering new ways to more fully integrate technology into the curriculum to encourage the active engagement and thinking of young children.

Testing Hypothesis 2

The null hypothesis states that there is no significant difference in the scores of Affect, Perceived Control (PC), Perceived Usefulness (PU), Behavioural Intention (BI) and Computer Attitudes (CA) of school and college teachers. Table 6 shows the relevant statistics of the scores of Affect, PC, PU, BI and CA of school and college teachers.

Table 6: Relevant and statistics of affect , PC, PU, BI and CA Scores of school and college teachers

Variable	Group (In terms of level of instruction)	Number of teachers	Mean	SD	t-ratio	Level of significance	100 ω estimate
AFFECT	School	45	24.00	3.74	0.92	N.S	-0.17
	College	45	23.22	4.25			
PC	School	45	20.73	3.00	0.39	N.S	-0.95
	College	45	20.96	2.64			
PU	School	45	16.02	2.90	0.23	N.S	1.07
	College	45	16.18	3.57			
BI	School	45	14.09	3.36	0.03	N.S	1.12
	College	45	14.07	3.79			
CA	School	45	73.73	13.34	0.10	N.S	-1.11
	College	45	73.98	11.44			

The tabulated values for't' are as follows (Garett, 1985): For df = 43, t at 0.05 level = 2.02. Similarly, for df = 43, t at 0.01 level = 2.71

Interpretation of 't': The obtained 't' ratios for Affect, PC, PU, BI and CA are 0.92, 0.39, 0.23, 0.03 and 0.10 respectively which are less than 2.02. Hence the difference is not significant for all the variables at 0.05 level. The null hypotheses for all the variables are, therefore, accepted.

Findings

There is no significant difference in the Affect, PC, PU, BI and CA of school and college teachers. However, the college teachers exhibit higher mean scores for all the variables except Affect and Behavioural Intention.

Discussion

The comparable scores of school and college teachers on each dimension of Computer Attitudes could be attributed to the fact that technology based learning has become an integral part of the education process for students of all ages. Gone are the days when school teachers restricted their teaching to the chalk and talk approach alone. Use of impressive power-point presentations for different theoretical topics of the curriculum have come to be a part of school teaching as well. Information Technology has now been included as a subject of the school curriculum to keep both students and teachers abreast with the latest developments in the world of technology resulting in a subsequent attitudinal change towards computers. School teachers are being adequately trained to take up the technological revolution in education as a challenge by attending orientation programmes all aimed at making them more techno-savvy. The Educomp Smartclass has brought about a complete transformation in school classrooms. It is a digital initiative that is fast becoming imperative for schools. It makes teaching and learning more engaging, interesting and experiential and is a futuristic way that improves teacher-effectiveness in the class by bringing abstract and difficult curriculum concepts to life. It thus helps in improving the academic performance of students and also enables instant formative assessment of learning outcomes in class. Colleges are no exception to the surge of technological innovations in the teaching-learning process. From classroom lectures to various projects, both students and teachers resort to the use of computers for both academic and administrative purposes. College teachers have to be well versed in their computer knowledge and skills in order to download reference material from websites/videos from you-tube in order to supplement their classroom teaching and prepare presentations. Hence it follows that school and college teachers do not differ significantly in their attitudes to the use of computers in the teaching-learning process, as the concept of education today has changed at all levels with the all pervasive intervention of technology.

Suggestion

Results of the current study may be used to inform policy makers, curriculum developers, teacher educators, and all stakeholders involved in the design of effective teacher preparation and in-service professional development programs. Secondary curricula in all disciplines should be of encouraging nature for teachers to use computers and technology in classrooms. Also, workshops and demonstrations of technology utilization across the curriculum should be conducted so that teachers participate so as to familiarize themselves with the developmental theory and research regarding computer use with hands-on experiences. Future research should examine the ways that teachers of young children are able to integrate the use of technology into the curriculum to enhance and enrich learning. As teachers implement the use of technology in their classroom teaching, their vision of the role of technology in teaching and learning will undoubtedly improve leading to a revolutionary change in their computer attitudes across all levels of instruction.

Conclusion

Using ICT in education should not be understood as using it as a tool to transfer instructional material but as a medium for learning, discovering, sharing and creating knowledge. Being the prime actors in implementing ICT in learning and teaching, teachers should be the centre of attention. They should be involved in all stages of the implementation process, at the same time being assured that this approach is advantageous over the traditional one, is compatible with their teaching practices and that technical help and training would be rendered as and when needed. It is only when teachers across all stages of instruction are sufficiently empowered to use technology effectively so as to enhance the quality of the teaching-learning process that education will find its true meaning.

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