# SCIENCE LECTURERS' PERCEPTIONS AND SELF-EFFICACY TOWARDS USE OF COMPUTER MEDIATED TECHNOLOGIES IN COLLEGE OF EDUCATION MINNA, NIGER STATE.

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**Abstract**

*The study investigated science lecturer perception, self-efficacy, usefulness and ease of use of computer mediated instruction (CMT) for teaching in a college of education. The study employed survey research design with eighty (80) respondents purposively used as the sample of the study. A questionnaire was used to gathered the data of the study. The validity and reliability of the instrument was ascertained. The Instrument was pilot tested and reliability was computed which yielded .82 coefficient using Cronbach alpha computation. The data of the study was subjected to descriptive analysis. The data was analyzed using frequency and percentage, mean, and standard deviation. From the study it is evident that science lecturers found CMT useful and also easy to use and most of them have a mastery of some basic computer mediated technologies (CMT) skills but some of the computer mediated technologies are not adequately and effectively used for instructional purposes. This implies that science lecturers in college of education Minna are yet to fully adopt computer mediated technologies for teaching and learning due to other factors not considered in this study.* ***It is therefore recommended that*** *the curriculum developers should review the curriculum so as to make the use of computer mediated technology compulsory for teaching and learning.Also periodic training should be given to lecturers to induce use of computer mediated instruction in the teacher preparation programmes.*

**Keyword:**Computer mediate instruction; Perception of usefulness; ease of use; self-efficacy

## Introduction

Lecturers' decision to reject or adopt technology for instructional related activities is a complex issue that remains a challenge for many higher institutions of learning the world over. Studies revealed the penetration of various technologies in educational settings, however, effective utilization of these resources in learning is still an uphill battle for many colleges and universities around the world (Ertmerr &

Ottenbreit-Leftwich, 2010; Kotrlik & Redmann, 2009; Moser, 2007; Oye, Salleh, and Iahad, 2011). As a result of superficial use of technology, researcherseek to understand the reason behind slow uptake of technology for teaching. In doing this, models are formulated and tested. Among such model is the one developed by Davis in 1986

The *Technology Acceptance Model* TAM (Davis, Bagozzi and Warshaw, 1989) is one of the most profound frameworks frequently used in studies to predict and explain the use of computer based applications and solutions. The model affirms that the adoption of a technology is determined by the user's intention to use computer technologies, which in turn is influenced by his or her attitudes towards the technology. It is very likely that the variableness in these attitudinal and behavioral constructs depends on the user's perceptions — *perceived usefulness* (PU) and *perceived ease of use* (PEU). While PU indicates the extent to which the use of the technology is promising to promote one's work, PEU represents the degree to which the technology seems to be free of effort (Davis et al., 1989). This model assumes that attitudes and behavioral intention mediate the effects of PU and PEU, the two constructs of extrinsic motivation.

Models and theories which attempt to predict and explain the acceptance and adoption of computer mediated technologies are many. For example, Rogers' *Diffusion of innovations* theory (Rogers, 2003; Straub, 2009) explains technology adoption as a process taking place over time and is dependent on factors such as attributes of the technology, nature of the social system in which the technology is to be adopted, role of change agents and opinion leaders, and adopter categories.

Computer mediated technologies (CMT) are the technologies that allows communication or interaction between people using computers or the computer network as a medium of communication (Romiszowki, 1989), also computer mediated technologies are the technologies that permits any form of communication between two or more individuals who interact or motivate each other via separate computers (Wikipedia, 2010).

Computer mediated technologies are revolutionizing the practices of teaching and learning at colleges and universities all around the world and the teaching institutions are making significant efforts in adopting the use of computer mediated technology.

However, in spite of this effort and investment the lecturers and faculty do not always use the technologies as expected and more often computer mediated technologies continue to be underutilized. However, the utilization of these technologies is sometimes prevented by some factors which according to Darell and Sellbom (2002) include economical, sociological and psychological factors. Other barriers to the utilization of computer mediated technologies are financial barriers, unavailability of computer hardware and software, lack of theoretical and technical knowledge, and lack of the acceptance of computer mediated technologies. As a result of the rapid technological change, a growing number of

institutions have adopted internet-based course delivery (Liaw, Huang & Chen, 2007) and have invested heavily in technology (Trentin, 2006; Yohon & Zimmerman, 2006). Massy and Zemsky (1995) conclude that higher education cannot become more productive or hold costs down unless colleges and universities embrace technological tools for teaching and learning. Yet, some lecturers embrace technology while others resist. In the 21st century, it is imperative for institutions to adopt technology for instructional purposes. Therefore, this study decided to look at the affective ramifications of computer mediated technology adoption, specifically perceived usefulness, perceived ease of use and self-efficacy.

This study contends that the decision to use technology is not only determined by the availability of resources and training, but also influenced by an individual's philosophical and inner feelings about such a phenomenon. Therefore, individual's perception plays a significant role in this process. Straub (2009) says "technology adoption is a complex, inherently social, developmental process, individuals construct unique yet malleable perceptions of technology that influence their adoption decisions. Thus, successfully facilitating computer mediated technology adoption must address cognitive, emotional, and contextual concerns". This study intends to provide some empirical data on lecturers' perceptions, self-efficacy and use of computer mediated technology. Oigara and Wallace (2012), Hardin (2006), and Tabata and Johnsrud (2008) "contend that the ability to use technology in teaching starts with lecturers' attitudes toward technology". Thus, the goals of this study are (1) to investigate lecturers' perceptions, self-efficacy and use of computer mediated technology, and (2) establish how these perceptions and self-efficacy can be influenced to promote positive attitudes towards computer mediated technology adoption. The study is situated within the Technology Acceptance Model.

Various models have been developed to explain acceptance of technology and usage behavior. Davis, Bagozzi, and Warshaw, (1989) developed the technology acceptance model (TAM) which suggests that two specific beliefs—perceived ease of use and perceived usefulness— determine one's behavioral intention to use a technology. Similarly, Venkatesh, (2000) developed a model of the determinants of perceived ease of use based on several anchors related to individuals 'general beliefs regarding computers and computer use i.e. computer self-efficacy, computer anxiety, and computer playfulness, and perceptions of external control (or facilitating conditions). Venkatesh, Morris, and Davis, (2003) compared eight models and their extensions on user intentions to use information technology and formulated a unified model, called the Unified Theory of Acceptance and Use of Technology (UTAUT), with four core determinants of intention and usage, and up to four moderators of key relationships. Venkatesh and Davis, (2000) developed and tested a theoretical extension of TAM (TAM2) that explained perceived usefulness and usage intentions in terms of social influence (subjective norm, voluntariness, and image) and cognitive

instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) which significantly influenced user acceptance.

Venkatesh and Bala, (2008) proposed the Technology Acceptance Model 3 (TAM3) based on TAM by Davis, Bagozzi, and Warshaw, (1989). They reported that perceived usefulness strongly influenced peoples' intentions. On the other hand, perceived ease of use had a small but significant effect on the intentions also but this reduced over time. This study sought to investigate lecturers perceived usefulness, perceived ease of use and self-efficacy as factors affecting effective adoption of computer mediated technologies by lecturers for teaching sciences and science related courses in college of education Minna.

**Purpose of the Study**

The aim of this study was to determine science lecturers' perceived usefulness, perceived ease of use, self-efficacy and use of Computer Mediated Technologies in College of Education, Minna. Specifically, the objectives of the study are to:

1. Determine whether science lecturers perceive computer mediated technologies to be useful for teaching and learning.
2. Determine whether science lecturers perceive computer mediated technologies easy to use.
3. Find out the state of self-efficacy of lecturers towards computer mediated technlogies
4. Determine the use of computer mediated technologies by lecturers of sciences.

**Research Questions**

The study sought to answer the following questions:

1. Is computer mediated technologies perceived to be useful by science lecturers?
2. Do science lecturers perceive computer mediated technologies ease to use?
3. Do science lecturers possess basic computer mediated technologies skill (self-efficacy)?

***Method***

Given the purpose of the study, the study employed survey research design to investigate science lecturers' perception regarding their perceived usefulness, self-efficacy and ease of use of computer mediated technologies. The population for the study comprised of all science lecturers of college of education, Minna. Purposive sampling method was used to select the sample of the study. 80 were sampled with 24 female respondents and 56 male respondents. The sample population was drawn from science lecturers belonging to various departments having a total of 56 lecturers, 24 others were selected at random from other science departments not categorized under the school of science. Each member of the population had an equal opportunity to become part of the sample, the participants were drawn at random from basically seven (7) departments in school of science of college of education Minna; department of chemistry, biology, physics, integrated science, mathematics, computer science, PHE. Lecturers of other science courses

not listed among the school of science were also sampled, such as department of agricultural science, geography, electrical electronics etc. are all classified under the field of sciences. Popper Karl R. (2002).However, the numbers from each department varied depending upon the willingness of participants to take part in the stud

The instrument used for data collection for the purpose of this study was a questionnaire which was designed to investigate the science lecturers' perceptions, self-efficacy and use of computer mediated technologies. The questionnaire consisted two sections. The first section which was section A asked questions relating to demographic details such as, gender, teaching experience, department, and highest academic qualifications. The type of data collected was ordinal data. Section B included twenty six (26) items was further divided into three sub-sections according to the research questions which are questions 1, 2, and 3 (see appendix I) using a five-point likert scale of SD= Strongly disagree, D=disagree, N=Neither, A=Agree, SA=Strongly agree for the first two research questions, and the third sub-section was the self-rating of their technology skills which is also a measure of self-efficacy and science lecturers usage of CMT for instruction using also a five-point likert scale; 1=Not confident at all, 2= Not confident, 3=Neutral, 4=Confident, 5=Very Confident and 1=Never, 2=Rarely, 3=sometimes,4=Often, 5=Very Often **The test instrument for the study was face validated by two lecturers in the department of science education, Federal University of Technology, Minna. All the necessary corrections were effected.**

The instrument was pre-tested using the pilot test with thirty five respondents from lecturers in Federal University of Technology Minna (FUT) in order to detect weaknesses and assess the respondents' general understanding and ability to respond to the questions. A review was done to incorporate changes to the weaknesses identified and a final draft was produced. Reliability of the measurement scales was tested using Cronbach alpha coefficient which gave an alpha reading of 0.96 indicating a strong reliability of the test instrument.

The research instrument was administered by the researcher personally to teaching staff of the Department of Science Education and Physical science lecturers in the college of education of Minna. Out of one hundred and twelve lecturers (112) that constituted the population of the study, eighty(80) respondents representing 71% completed the questionnaire, the respondents were given 3 days in which to complete the questionnaires and returned it.

The data collected for the purpose of the study was analyzed using the statistical package for social science (SPSS) which measured the frequency and percentage, mean and standard deviation of the data.

## RESULTS

**Research question 1:** Is computer mediated technologies perceived to be useful by science lecturers?

**Table 1: Mean response of science lecturers perceived usefulness of computer mediated technologies**

| Items | SD F (%) | D F (%) | N F (%) | A F (%) | SA F (%) | MEAN | STD | DECISION |
|---|---|---|---|---|---|---|---|---|
| Computer mediated technologies enhance student's performance | 1(1.3) | 1(1.3) | 2(2.5) | 44(55.0) | 32(40.0) | 4.31 | 0.704 | Agreed |
| Computer mediated technologies improve the quality of my academic research | 1(1.3) | | 5(6.3) | 27(33.8) | 47(58.8) | 4.49 | 0.729 | Agreed |
| Computer mediated technologies (e.g.) video based online courses. Email enhance my dissemination of Information to students | | 3(3.8) | 12(15.0) | 46(57.5) | 19(23.8) | 4.01 | 0.738 | Agreed |
| Computer mediated technologies can allow me to do more interesting and imaginative work | 1(1.3) | | 10(12.5) | 43(53.8) | 26(32.5) | 4.16 | 0.737 | Agreed |
| Computer mediated technologies can be used to perform most task that I cannot do myself | 1(1.3) | 9(11.3) | 8(10.0) | 31(38.8) | 31(38.8) | 4.03 | 1.031 | Agreed |
| Computer mediated technologies can enhance the presentation of my work to a degree which justifies the extra effort | | 5(6.3) | 8(10.0) | 38(47.5) | 29(36.3) | 4.14 | 0.838 | Agreed |
| Computer mediated technologies make it possible to work more productively | 1(1.3) | 1(1.3) | 3(3.8) | 44(55.0) | 31(38.8) | 4.29 | 0.715 | Agreed |

**Keys SD** = Strongly Disagree, **D** = Disagree; **N** = Neither; **A** = Agree; **SA** = Strongly Agree
Decision mean=3.00

The table 4.1 shows science lecturers' perceived usefullnes of CMT for teaching. The results showed that most respondent agreed that computer mediated technologies enhance student's performance with 55% and 40% for agree and strongly agree respectively. While 58.8% strongly agree that CMT improves their academic research and 38.8% agree to it. The data on table 4.1 shows clearly that the respondents agreed with all the items with mean scores of 4.01-4.31 this implies that science lecturers perceive computer mediated technologies to be useful and as such there is likelihood they use it for teaching.

1. **Research questions two:** How do science lecturers perceive computer mediated technologies ease to use?

**Table 2: Mean responses of science lecturers on the perceived ease of use of Computer Mediated Technologies**

| | Items | SD F (%) | D F (%) | N F (%) | A F (%) | SA F (%) | MEAN | STD | DECISION |
|---|---|---|---|---|---|---|---|---|---|
| 8. | I find Computer mediated technologies (e.g.) wikis, web blogs, e-mail etc. easy to use | 2(2.5) | 10(12.5) | 3(3.8) | 42(52.5) | | 3.93 | 1.028 | Agreed |
| 9. | It's easy for me to assign task to Computer mediated technologies | | 7(8.8) | 14(17.5) | 44(55.0) | 15(18.8) | 3.84 | 0.834 | Agreed |
| 10 | I find my interaction with Computer mediated technologies clear and understandable | | 3(3.8) | 6(7.5) | 44(55.0) | 27(33.8) | 4.19 | 0.731 | Agreed |
| 11. | I find technology (e.g. computers, data projector, learning management systems etc.) easy to use | 1(1.3) | 6(7.5) | 12(15.0) | 35(43.8) | 26(32.5) | 3.99 | 0.948 | Agreed |
| 12. | I find it easy to get technology to do what I want it to do | | 8(10.0) | 7(8.8) | 41(51.2) | 24(30.0) | 4.01 | 0.893 | Agreed |

Decision mean=3.00

Table 3: Shows the perceived ease of use of Computer Mediated Technologies by science lecturers. Results showed that over 55% find CMT easy to use while respondents between10 to 40 percent indicated that they don't find CMT easy to use and therefore further training is needed. The data from table 4.2 above reveals that the respondents agreed with all the items with mean scores between 3.84-4.19 this implies that that science lecturers perceive computer mediated technologies easy to use for teaching.

**Research question4:** To what extent do science lecturers possess basic computer mediated technologies skill?

**Table 4** Mean responses of science lecturers on basic computer mediated technology skills

| S/No | | 1 F (%) | 2 F (%) | 3 F (%) | 4 F (%) | 5 F (%) | MEAN | ST D | Decision |
|---|---|---|---|---|---|---|---|---|---|
| 13. | Operate presentation software (e.g. Microsoft power point) for instruction | ------- | 8 (10.0) | 12 (15.0) | 39 (48.8) | 21 (26.3) | 3.91 | 0.903 | Confident |
| 14. | Use of project with a laptop or PC for presentation | 1 (1.3) | 6 (7.5) | 10 (12.5) | 39 (48.8) | 24 (30.0) | 3.99 | 0.921 | Confident |
| 15. | Us spread sheet on Microsoft excel to record data, computer simple calculations and represent data inform of graphs or tables | --------- | 7 (8.8) | 15 (18.8) | 40 (50.0) | 18 (22.5) | 3.86 | 0.868 | Confident |
| 16. | Use social network (e.g. twitter, instagram, Facebook etc.) to communication with your colleagues. | 1 (1.3) | 9 (11.3) | 11 (13.8) | 29 (36.3) | 30 (36.3) | 0.807 | 1.024 | Confident |
| 17. | Use email (e.g. Hotmail, Yahoo mail, Gmail etc.) to send or receive assignments from students. | 1(1.3) | 7(8.8) | 16 (20.0) | 24 (30.0) | 32 (40.0) | 3.99 | 1.037 | Confident |
| 18. | Copy text from web and page and pest it to a document in Microsoft word | 1 (1.3) | 1(1.3) | 9(11.3) | 34(42.5) | 35(43.8) | 4.26 | 0.807 | Confident |
| 19. | Use internet to search for information and resources | 1(1.3) | 2(2.5) | 4 (5.0) | 12(15.0) | 61 (76.3) | 4.63 | 0.802 | confident |

Table 4.3 showed all respondents possess basic computer mediated technologies skill as result shows all respondents to be confident in the use of computer mediated technologies. As such science lecturer would easily found it not difficult to deploy for teaching.

**Research question 4:** Are science lecturers using these technologies for instruction?

**Table 5 mean response of science lecturers' use of computer mediated technologies I use.....**

| Item | Never F (%) | Rarely F (%) | Sometimes F (%) | Often F (%) | Very often F (%) | MEAN | STD | DECISION |
|---|---|---|---|---|---|---|---|---|
| Computer mediated technologies for instruction to enhance students learning | 6(7.5%) | 10(12.5%) | 26(32.5%) | 28(35.0%) | 10(12.5%) | 3.33 | 1.088 | Positive |
| Computer mediated technologies in my course to enrich my teaching | 5(6.3%) | 10(12.5%) | 15(18.8%) | 29(36.3%) | 21(26.3%) | 3.64 | 1.183 | Positive |
| Internet for resources when developing course material | 6(7.5%) | 5(6.3%) | 2(2.5%) | 33(41.3%) | 34(42.5%) | 4.05 | 1.179 | Positive |
| Microsoft excel spread sheet to analyze students work | 8(10.0%) | 11(13.8%) | 17(21.3%) | 28(35.0%) | 16(20.0%) | 3.41 | 1.240 | Positive |
| Data projector during instruction | 12(15.0 %) | 21(26.3%) | 29(36.3%) | 9(11.3%) | 9(11.3%) | 2.78 | 1.180 | Negative |
| Email to keep students up to date on grades and students' progress | 12(15.0 %) | 21(26.3%) | 14(17.5%) | 20(25.0%) | 13(16.3%) | 3.01 | 1.336 | Positive |
| Social networks (e.g. Facebook, twitter) to communicate, encourage or collaborate with my students | 12(15.0 %) | 22(27.5%) | 11(13.8%) | 20(25.0%) | 15(18.8%) | 3.05 | 1.377 | Positive |

Decision mean= 3.00

The table 5 shows the usage of CMT by science lecturers. From the results it can be seen that most lecturers indicated use of CMT in items 20, 21, 22, 23, 25 and 26, while only 22.6% indicated the use of data projector in item 24 and about 41.3% indicated that they were not using data projector for instruction while the remaining 36.3% respondent were neutral. It can also be observed that respondents indicated positive use of items 20, 21, 22, 23, 25, and 26, that is to say the technology has been adopted by the lecturers with the exception of item 24 with a mean response of 2.78 which < 3.00 ( the decision mean) indicating a negative response to the use of the technology i.e. the use of data projector during instruction.

## Discussions

This study sought to probe the science lecturers' perceptions, self-efficacy and use of Computer Mediated Technology through the guidance of Technology Acceptance Model. According to this model and other previous studies, attitudes play a significant role in the adoption of computer mediated technology in learning (Abukhzam& Lee, 2010; Kim, Chun,& Song, 2009). This study investigated science lecturers' perceptions and self-efficacy as factors that influence this adoption as an effort to assist in cultivating positive use of computer mediated technologies among science lecturers in teaching and learning. According to TAM, attitudes towards technology are influenced by perceived usefulness and perceived ease ofuse.

The results of this study confirmed this proposition as it showed that science lecturers perceive CMT to be useful and easy to use. Because these two variables have had such a significant impact on attitudes, it was very important to investigate the factors themselves to determine how they could be positively influenced with the ultimate goal of promoting computer mediated technology adoption. In this study, self-efficacy was brought in as an external variable that hypothesized to have had a significant influence on people's perception on the usefulness of technology and on its perceived ease of use. However, the results of this study indicated that most science lecturers have computer self-efficacy.

The level of self-efficacy on the use of Computer Mediated Technology as shown in this study is intriguing because logically one can assume that if a person believes in his/her capability to perform an activity, then that should improve the person's perception toward its ease of use as shown by similar empirical studies (Lee & Medlinger, 2011;Uwaifo, 2010). The participants in this study reported high self-efficacy levels, which in turn influences the use of computer mediated technologies.

The findings from table 4.4 revealed that science lecturers have adopted to the use of computer mediated technologies for instruction but also showed that perceived usefulness, perceived ease of use and computer self-efficacy were not the major factors influencing the use of such technologies as a non-use of data projector for instruction was noted despite the response from table 4.1 all lecturers agreed that computer mediated technologies was useful and table4.2 all agreed that computer mediated technology was easy to use and table 4.3 revealed that most science lecturers were confident in operating most computer mediated technologies i.e they have high self-efficacy levels. In a similar manner, this study showed that self-efficacy did not influence science lecturers' use of computer mediated technology, which means that just because the participants believed that they had confidence in using technology, this did not necessarily mean that they were using the technology. A possible explanation to this lack of relationship between self-efficacy and perceived usefulness may be through Bandura's social modeling concept that posits people's ideas of usefulness can be influenced by observing how useful something is to other people, which eventually make them believe it is useful to them too. However, whether they actually find technology useful to their practices is what is paramount because that translates into positive attitudes. This lack of use of some computer mediated technologies goes some way in explaining why even after training and availing instructors the best of technologies they still do not use them, possibly because they may not have yet established this usefulness for their own benefit.

**Recommendations**

The following are the recommendations made from the findings of the study

1: Retraining should be provided to lecturers on the use and operation of computer mediated technologies in instruction.

2: The curriculum developers should review the curriculum so as to make the use computer mediated technologies

compulsory for teaching and learning.

3: The school authority should collaborate with private organization to organize workshops and seminars for the lecturers on the use and adoption of computer mediated technologies in instruction.

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