

Factors Affecting To Technology Adoption by Teachers

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ABSTRACT: *This research paper, I intend to examine the attitude of teacher regarding the use of technology in their classroom. Through this examination I hope to develop a better understanding of the factors affecting to technology implementation. My research shows that there are affecting to technology integration despite the considerable political pressure to use technology in the classroom. Technology is considered a critical part of our children's educational environment. Despite the pressure the factors affecting to technology adoption have prevented it from becoming part of the normal operations of classrooms. While there are many factors such as costs, reliability and training that play into the implementation of technology, we examine how teacher attitude impact technology adoption.*

KEY WORDS: *Factors, Technology adoption, Teachers Attitude, Technology in classroom, Technology in home*

I. INTRODUCTION

As individuals interested in the use of instructional technology for differentiating instruction and providing alternative educational settings, I was interested in the current lack of technology adoption. Many other profession use technology extensively and there is a continuous chorus of business leaders and public figures calling for the increased use of technology in the classroom. Thus I am currently interested in factors that hinder teachers from adopting technology. There are many effort intended to integrate technology in to the classroom. A great deal of time and money is spent on the pursuit of providing technology tools to teachers and students. The perception seems to be that technology will improve the education of our children. I wanted to answer the following questions: What keeps teachers from making greater use of technology, especially in the light of other professions adopting technology to make their jobs easier or more efficient? Considering the resources and effort expended to implement technology this question is important. There are many studies in the field today related to the problems with the implementation of technology in the classroom. Most seem to deal with issues related to how to convince teachers to use technology more effectively. Because our question is trying to understand why teachers do not use technology I have found various factors, when I was worked as a block resource teacher educator, under Sarva Shiksha Abhiyan (SSA) and CBSE Schools, Matriculation Schools, State board Schools in Tamil Nadu State, India. Here I used my past and present experience in the field of education.

The research I reviewed had several reoccurring themes. First is that technology implementation is a problem. Second teacher attitudes are important barriers or aids in their personal implementation of technology. Finally training is a continuing problem. It is not just a lack of training however but training specific to the needs of the teacher and to the usage of technology in instruction. My project is designed to help us develop an understanding of the factors that inhibit the adoption of technology in the classroom. I felt that teachers' resistance to the adoption of technology came from a perceived lack of benefit relative to the costs of learning the technology. I also felt that teachers are actually using technology frequently; they just may not be considering their usage as part of their professional duties. In order to better understand the hindrances towards technology adoption in the classroom I intended to determine the attitudes teachers have towards technology usage. I intend to interview teachers who have expressed frustration towards technology to understand their attitudes. I hope to gain insight into how teachers' attitudes prevent their adoption of technology in the classroom. The significance of the research was through an understanding of the factors limiting the adoption of technology tools I could develop methods for mitigating these factors. With the tools for improving the implantation of technology I hope that schools and districts will better utilize the resources they put forth **on these technology** projects. A better use of resources is always important but considering the current economic challenges schools are facing now it is even more critical.

II. DESIGN AND METHODOLOGY

I wanted to learn more about attitudes towards technology from teachers in Chennai, Tiurvallure and Tiruchirappalli districts Schools of Tamil Nadu state in India. In the first phase of the study I distributed surveys to teachers who taught every grade between first standard to higher secondary school. One middle school and one elementary school high and higher secondary school were selected in each one districts. For the second phase of the study, we selected one first grade teacher, one third grade teacher, one fifth grade teacher, and one middle school social studies teacher. The teachers selected for interviews were chosen based on pre-established criteria from the randomly distributed surveys.

Instrumentation/Data Collection: Survey questions were generated to help analyze two outlooks related to technology use in the classroom. I used a five-point forced-choice Likert Scale to measure these attitudes. The first set of questions was designed to determine how teachers used technology in their personal lives. I asked questions about such items as the ability to programs radio stations in their car, send text messages from a cell phone, and use a GPS device. With this set of questions I hoped to find out to what degree teachers felt comfortable using technology in their own lives outside of the classroom. The second set of questions asked about attitudes towards the use of technology within the classroom. I asked questions about whether they felt that technology could effectively be used by student of all ability levels, whether technology makes teaching easier, and whether technology is a valuable instructional tool. Additionally I asked teacher to rate their personal use of technology and their use of technology in the classroom. Lastly I asked teachers what software programs they use on a regular basis.

At the surveys were distributed to 125 teachers in elementary, middle, high and higher secondary schools from three district including secondary grade teachers (SGT), middles grade teachers (MGT) high and higher secondary (B.T ASST. and P.G.ASST.) schools. Of the 125 surveys distributed we received responses from 105 individuals directly collected by the researcher. Eight paper surveys had to be discarded due to incomplete responses, leaving us with 97 surveys to analyze. In the course of looking at the results, I decided to discard one survey question with seemed to cross the affecting between personal use and school use (I use email at work). From the surveys, I calculated two scores for each individual. The first, the measure of personal teacher use of technology was a composite of the first 10 items from section one (after the elimination of the crossover question). I then calculated a composite score of teacher attitudes towards technology in the classroom by measure items 11-21 from the first section. For items 16 and 20, I had to reverse code the score to make calculating the composite consistent with a positive attitude toward the use of classroom technology. Having obtained the two composites, I subtracted the personal use score from the attitude toward classroom technology score. Teachers with the greatest difference would be the ones I wanted to select for more in depth interviews. After determining this difference, I looked only at teachers who would submit to an interview. After selecting two individuals apiece, the two of us arranged for 30 minute interviews. All participants were interviewed in their classrooms to help them feel more comfortable. They were sent a copy of the interview questions ahead of time to help ensure complete and thoughtful responses. During the course of the interviews, I would sometimes ask additional questions designed to provoke further responses when I wanted to find out more about topics the participant raised. In addition to taking notes during the interviews, all participants were recorded using digital encoding software for later review.

Data Treatment Procedures: After analyzing both sets of notes, I looked for the most common reasons that keep teachers from using technology more in their classrooms. Each individual brought up a number of barriers to classroom technology use. I wrote down each barrier in a spreadsheet cell. I then dragged them into columns with similar responses. After all the factors were allocated, I selected the longest columns and attempted to assign a category to them. I settled on four: 1) Reliability, 2) Time, 3) Training, and 4) Availability. Then I reviewed the remaining cells to determine if any of those factors were related to the categories I had created. Using inductive reasoning, I hoped to make some generalizations by first analyzing the words of the teachers themselves.

Presentation of Findings

Reliability: Many teachers felt that one factor keeping them from relying on technology was their inability to rely on it. Computers are complex machines on their own. When attempting to network them, the complexities grow. The failure of one critical component can keep the system from functioning properly. Had these teachers some basic or, in many cases, advanced trouble-shooting skills these factors could have been overcome in some circumstances. In other circumstances, there was nothing an ordinary classroom teacher could do, since the failing systems were out of their control. A teacher expressed her frustrations with reliability by stating: "Things break down all the time. Sometimes I can't get speakers to work. A cable may come loose and I end up spending more time getting the setup together than just planning the lesson itself."

I think I would be more inclined to use technology if I were guaranteed that it would work every single time. And if it didn't, then I could get someone in there right away to help get the lesson running. I think there is a possibility of failure every single day. I get frustrated when things don't work when I want them to." One factors that teachers could have theoretically have overcome themselves was problems with wires. Because of the sheer number of wires used in computer setups, the possibility of them coming loose is great. Computers had wires for monitors, keyboards, mice, speakers, printers, document cameras, projection units, and the network (which in a couple cases was necessary to even log into the computers and access files). Young children had the greatest propensity of tripping over or inadvertently pulling out wires. In one classroom, the teacher's computer was in the front of the room, where it was hooked up to be used for demonstration purposes (with a document camera and an LCD projector).

The first graders in the room had played with the wires so many times, that the teacher simply gave up using the unit for lessons. After school, or when she had time, she would plug the wire back in where it belonged, but often there was not enough time to do this while class was in session. Hence the computer could be used for grades or email, but not for online demonstrations or video clips for the class. While training and practice might make troubleshooting some of these reliability problems less of a factors, many teachers are unable to take the time to figure out how to solve the problems they are faced with. It is often easier to rely on equipment that never (or rarely fails), like white boards and overhead projectors. One model of document camera was notorious for failing at inopportune times. The teacher would be in the middle of a demonstration and all of a sudden, the image would freeze. Teachers found that by rebooting, they could get the system operational again, but the time taken to reboot was longer than the time taken to pull out an overhead projector and use that (assuming that the teacher still had one). It was later discovered that by unplugging the camera and subsequently plugging it back in (to the correct USB port), and restarting the program the camera would become functional again. This problem was only solved by trial and error over the period of a couple years. In the meantime, teachers learned that they could not always rely on these setups.

There are other problems, teachers have no control over. When a server stops functioning, critical functions come to a halt. One teacher mentioned a problem a few years ago. Apparently all of the schools internet traffic was controlled by one main computer that was located in the district office. When the machine stopped functioning, all internet traffic ceased. A teacher who had prepared to take his or her class to the lab for an internet search or to use an internet based program would find themselves cut off and now have to scramble to find something to do while trying to find someone to reboot that particular server. Teachers who tired of having backup plans used the computers less. Sometimes a teacher would discover a critical program was missing or corrupted. With restricted accounts, teachers were not always able to install the programs they needed themselves. Work orders would have to be submitted. This became one more obstacle. Those who did not know exactly what they were missing were forced to submit vague requests. One site had a series of computer failures due to defective hard drives. Eventually, the hard drives were replaced, but the inconvenience was great. Later, at the same site, teachers discovered that a different model had defective power supplies, so these now had to be replaced after failing time.

From our literature review, I knew that teachers in Tamil Nadu found themselves with little time to devote to technology integration within their classroom due to pressure to perform well on tests. A similar problem exists in their districts. While teachers do not voluntarily sacrifice technology to spend time on test-taking practice, failure to perform well on standardized tests has brought consequences. The national No Child Left behind (NCLB) Act and state demands for Academic Performance Indicator (API) growth has placed some schools in Program Improvement (PI) category. Schools that find themselves in this category face several possible sanctions. One way to deal with being identified as a PI school is to begin "faithfully implementing" the core curriculum. A teacher says, "I don't think we have enough time to get students on the computers. We have one lab and the restraints on the curriculum. When they say you must teach your language arts curriculum and it must be done the way the textbook says, it makes it difficult to be creative and include technology." Faithful implementation involves using state-approved curriculum for a specified number of hours a day. The use of these materials for such a great part of the day necessarily entails making sacrifices. One easy sacrifice is technology. Without the freedom to use it with the core-curriculum and without the time to use it at other times of the day, the small bank of computers at the back of the classroom languishes. Teachers are simply unable to find the time to effectively integrate technology in a constructivist fashion. For a time, computer lab access was restricted to non-language arts blocks of time. With some grades sharing language arts time, this left little time to make it to the computer lab at all. Teachers, whose classes shared lab times and alternated weeks, found themselves so confused that many stopped going altogether.

Teachers who used to find time to do their own planning now see their time consumed by long staff meetings, forced grade-level collaboration and data analysis. Time for creative, thoughtful planning is at a minimum. Without this time, there are fewer attempts to integrate technology into lessons. Since this often involves, not only planning the lesson, but testing the programs, this is done less.

Training: The teachers we interviewed also expressed a frustration with the expectations for their use of technology without training. Specifically the concern was developing comfort with the tools so that it would be easier to implement them into instruction. Two teachers expressed concern that they were not trained on the use of the technology tools provided by the district. Teacher said, “When I started I was not shown how to use the technology tools the school provides. I had to learn them on my own.” This impacts teacher time and desire to use technology.

Components: Finally another are that teachers expressed dissatisfaction with was the lack of functional technology. While we addressed reliability earlier, teachers wanted to have additional types of technology available to them. Teachers expressed desire for digital whiteboards and document projectors. Also surprisingly a teacher expresses a desire for more computers in their classrooms.

Limitations: The single biggest factor limiting our design was lack of time. Ideally, I would have conducted more interviews to help us gain a broader perspective on the problem I researched. Additionally, having more time would have given us the opportunity to refine our interview questions further. After the first round of interview, I would like to have probed the participants with more direct questions about the categories we had originally generated. In the process of getting our participants to elaborate further on their own responses, I was given ideas that would have worked well on previous participants. For instance, after discovering that lack of time was a factor, we could have asked specific questions to others about how lack of time influences their decisions to leave technology out of their lessons. Having more schools and districts to find participants would also have helped us learn more. By interviewing teachers who work in different places, we would have seen how they felt about issues like time or reliability that our teachers felt so strongly about.

I. Teachers attitude about the technology in the classroom

S.No.	Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Rating average	Response count
1	I can program the stations on my house/car radio/cell phone	88.6%(86)	6%(6)	3%(3)	2%(2)	0.0%(0)	1.02	97
2	I can use digital camera and transfer picture to a computer	20.7%(21)	15.8%(16)	10.3%(10)	22.7%(23)	27.8%(27)	1.00	97
3	I can use word processor to create documents	63.9%(62)	23.7%(23)	2.0%(2)	5.1%(5)	5.1%(5)	1.02	97
4	I can use an ipad/digital music player	46.3%(45)	29.8%(29)	6.1%(6)	7.2%(7)	10.3%(10)	1.02	97
5	I use a cell phone to send a text message	92.7%(90)	5.1%(5)	1.3%(1)	1.3%(1)	0.0%(0)	1.03	97
6	I use a computer at home	73.1%(71)	16.4%(16)	20.6%(20)	7.2%(7)	1.0%(1)	1.21	97
7	I use a GPS device	48.4%(47)	22.6%(22)	17.5%(17)	5.1%(5)	6.1%(6)	1.02	97
8	I use email at home	85.5%(83)	6.1%(6)	1.0%(1)	5.1%(5)	2.0%(2)	1.04	97
9	I use email at work	61.8%(60)	20.6%(20)	3.0%(3)	10.3%(10)	4.1%(4)	1.02	97
10	I use technology effectively	37.1%(36)	25.7%(25)	6.1%(6)	17.5%(17)	13.4%(13)	1.02	97
11	I use internet daily	27.8%(27)	19.5%(19)	18.5%(18)	3.0(3)	30.9%(30)	1.02	97
12	Technology can be used for students at all ability level	69.0%(67)	10.3%(10)	5.1%(5)	6.1%(6)	9.2%(9)	1.02	97
13	Technology helps improve	75.2%(73)	10.3%(10)	1.0%(1)	3.0(3)	10.3%(10)	1.02	97

	student performance							
14	Technology in the classroom is more successful if teachers have and use computers at home	79.3%(77)	9.2%(9)	5.1%(5)	0.0%(0)	6.1%(6)	1.02	97
15	Technology is a valuable instructional tool	46.3%(45)	7.2%(7)	22.6%(22)	11.3%(11)	12.3%(12)	1.03	97
16	Technology is difficult to use	49.4%(48)	12.3%(12)	12.3%(12)	13.4%(13)	12.3%(12)	1.02	97
17	Technology is more useful when there are sufficient resources available	55.6%(54)	11.3%(11)	13.4%(13)	12.3%(12)	7.2%(7)	1.02	97
18	Technology is only successful when it is maintained and properly repaired	34.0%(33)	22.6%(22)	15.4%(15)	15.4%(15)	12.6%(12)	1.03	97
19	Technology requires comprehensive training	48.4%(47)	17.5%(17)	22.6%(22)	10.3(10)	1.0%(1)	1.02	97
20	Technology makes teaching easier	72.1%(70)	2.0%(2)	2.0%(2)	18.5%(18)	5.1%(5)	1.02	97
21	Technology acquire me to devote more time to planning	92.7%(90)	2.9%(2)	2.9%(2)	2.9%(2)	1.9% (1)	1.11	97

II. How often teachers use technology in the classroom:

Time	Response Percentage	Response count
a).All the time	5.1%	5
b).Frequently	21.6%	21
c).Occasionally	28.8%	28
d).Rarely	41.2%	40
e).Never	3.09%	3

III. Teachers time spend using technology at home or for personal reason

Time	Response Percentage	Response count
a).All the time	4.1%	4
a).10hours/week or more	13.4%	13
b). 5-10 hours/week or more	27.8%	27
c). 2-5 hours/week or more	23.7%	23
d). 1-2 hours/week or more	27.8%	27
e). 0 hours/week or more	3.0%	3

IV. Teachers describe themselves as a user of technology

a).Description	Response Percentage	Response count
a). Expert	3.0%	3
b). Advanced	6.1%%	6
c). Average	58.7%	57
d). Beginner	20.6%	20
e).Unfamiliar	11.3%	11

V. Teachers use software programs at home

Software	Response Percentage	Response count
a).Internet browser (firefox, internet explorer)	13.4%	13
b). email	16.4%	16
c). Search engine(Google, yahoo)	9.2%	9
d). Word	34.0%	33
e). Excel	18,5%	18
f). Power point	8.2%	8

VI. Teachers use different software programs at home

Software	Response Percentage	Response count
a). Grade book	9.2%	9
b). Internet browser (Fire box, Safari etc)	17.5%	17
c). Search engine(Google, Yahoo)	21.6%	21
d). Curriculum software(Plato, Edusoft etc)	15.4%	15
5). Word	24.7%	24
6). Excel	7.2%	7
7). Power point	4.1%	4

VII. Teachers willing to be interviewed regarding their usage of technology

Yes	50.5%	49
No	49.4%	48

Interview Questions:

What do you think are the primary barriers for using technology in your classroom?

What would be the ideal implementation of technology in your classroom?

Have you ever taken an online class/course?

If you could design your classroom anyway you wanted how would you do it?

What technologies do you use on your own or at home?

What are the factors affecting when you using technology?

III. CONCLUSIONS

After conducting in depth interview, I discovered several factors to the use of classroom technology among teachers. The first issue, reliability, is a critical factor. Until computer reliability approaches that of other technology components, teachers will never learn to rely on it. The solution is, perhaps, a convergence of two developments. First the technology itself must have more bugs worked out. The move to centralized, professionally maintained servers hosting all files and applications may improve the situation. If teacher are left with simple devices to connect to the servers fewer technical problems may result. Secondly, teachers themselves may need to find effective ways of troubleshooting problems themselves. Perhaps time and experience with the machinery will provide this. The second factor, lack of time, affects some teachers more than others. Without time to properly devote to lesson planning and testing, technology will not be properly integrated into these teachers' technological repertoire. These factors may be solved with the development of more close integrated software. As textbook publishers devote more energy to software programs, teachers who find themselves without time to devote to their own technology lessons, may come to rely on software provided by publishers whose components are required for use. The third factor, is training. Teachers consistently claim lack of training of a hindering factor in their implementation of technology. But we need to be smarter about how technology training is introduced. It may be better to train local peer experts in-depth (Zhao and Frank, 2003) then to train all the staff at once. The subject experts will be available to staff as coaches in their normal work environment. If schools and districts are able to increase the reliability of technology, show teachers how to use it effectively, then teachers will see the potential time benefits of utilizing some technology.

IV. RECOMMENDATIONS

Since reliability was one of our key findings, one possible area of future study is finding out under what circumstances if reliability not an issue for a teacher. Have some teachers developed troubleshooting skills on their own? If they have, how did they gain these skills, and is there a way of others to similarly develop them? We believe that further interviews into this area are warranted. Also, is there any real evidence that publishers, whose materials teachers are required for use, have made improvements in the software they have been offering. A survey of teachers who have been around long enough to remember at least two rounds of adoptions may be of value here. Other recommendations include improving our model for delivering training to staff. If teachers need more time to learn a new skill or need to have the skills to deal effectively with their technology tools, we need to provide them with training. However, large group training does not seem to be effective for this task. Resources would be better spent helping a few key teachers become coacher for their peers.

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