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Making the Internet transition: assessing the needs of secondary public school teachers

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MAKING THE INTERNET TRANSITION:
ASSESSING THE NEEDS
OF SECONDARY PUBLIC SCHOOL TEACHERS

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ABSTRACT

Since the introduction of Internet technology in public schools, teachers who are enthusiastic about computer and Internet training have responded to school districts' offers of off-site training and take part in grant-based programs to promote the use of technology. The first phase of promotion by attraction has been completed. The remaining teachers are not as enthusiastic and look to the school district to provide them with the type of training they require in order to incorporate Internet technology.

Access to the Internet is just one of many elements involved in the overall problems that public high school teachers face using Internet technology in the classroom. Differences in the definition of access between teachers, schools, and districts, as well as teachers' perception of students, of school district support, and of self-ability can create barriers to actual use even with Internet access. Using the Social Construction of Technology (SCOT) theory to guide this qualitative research, forty-six interviews allow the perceptions of English teachers to be categorized under a descriptive framework that permits the identification of three different groups of Internet users, or relevant social groups: Refusers, Trained Non-users, and Internet Users.

Several key findings emerge from this study: (1) Virtually all teachers feel it is the school districts' responsibility to teach them to use Internet and computer technology; (2) Teachers do not consider it appropriate to bother on-campus support staff with questions about implementing the Internet into classroom activities; (3) The presence of a printer in the classroom provides an important link to Internet use; (4) Teachers who report frequent use in the classroom are less impressed with the Internet as a research tool than teachers who have received training, but do not use the Internet; and (5) More experienced teachers are not as apt to claim

expertise even though their use of the Internet would indicate this to be so, a fact that implies

probable underreporting of expertise on previous surveys.

CHAPTER 1. INTRODUCTION

The introduction of computers into American homes brought new visions for the future of education. As more and more citizens began to explore the plethora of information available at the click of a button, educators and reformers alike seized on the idea that the Internet had the ability to transform the country's educational system. Calls went out for classrooms in every school to be connected to the Internet (Newman 1992; Hunter 1992; Carlitz 1991). The pervasive idea was that if enough money was devoted to equipment and training, teachers would automatically shift from traditional lecturing to student-based exploration, or constructivist methods,[1] and educational opportunities for youth would begin to equalize. New hope for a troubled educational system rode on the wave of survey results that indicated ever-increasing numbers of Americans were connecting to the Internet. Purveyors of caution for the rapidly spreading effort to wire-up schools (Cuban 1986; Hodas 1993) were pushed aside by the numbers. In 1994, thirty-five percent of public schools had Internet access; in 1996 sixty-five percent; by 1998, it had climbed to eighty-nine percent. By 2001, reports from national teacher surveys using the Fast Response System Survey (FRSS) indicate that 98 percent of all public schools in America had Internet access (NCES 2002).

The Department of Education has used these reports to support claims of progressive changes taking place in the quality of education being offered to our young people through information technology (NCES 2001). At first glance, the reports seem positive and give the impression to the majority of the American public that Internet technology is being successfully utilized in the classroom. However, contrary to national survey results, my interviews with teachers suggest that mere access in public high schools is not a good indicator of Internet use in

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[1] Constructivist methods focus on enhancing problem-solving strategies and critical thinking skills.

the classroom. Access to the Internet is just one of many elements involved in the overall process of using Internet technology in the classroom. Properly functioning equipment, effective training, and ongoing technical support provide the backbone for use. Yet teachers' perceptions of students, of school district policies and responsibilities, and of their own ability are contingent factors in determining whether *access* to the Internet becomes actual Internet *use* in the high school classroom.

In order to examine the extent of Internet implementation in the classroom, a contextualist view is employed in this thesis. Contextualists consider the economic, political, social, and scientific aspects of a technical process as influential to its developmental outcome. In this study, teachers' classroom use of the Internet is the technical process. Influential usage factors are addressed through personal interviews with forty-six English teachers. For example, within the context of a teacher's public high school workplace, parents generally advocate the latest technology for their children in the institution that is perceived to ready them for the future. Low-income families look to the schools to provide opportunities for their children to receive adequate training and skills through exposure to technologies they cannot provide. At the same time, school districts are concerned with meeting federal and state mandates to increase the scores on standardized tests designed to target those schools that fail to offer a threshold level of education to students (Tetenbaum 1986). Developing technology plans throughout a school district is an additional goal for administrators who must keep curriculum current for students in order to satisfy their student/parent constituents and stand up to comparison with schools in other districts and across the nation. Caught in the middle are the teachers with varying years of experience and technical expertise who struggle to satisfy both the needs of the students and the districts that employ them.

This research centers on teachers and the process of technical change they face with the implementation of Internet technology in the classroom. The Social Construction of Technology (SCOT) approach allows us to gain insight, beyond the scope of existing surveys, into the ways that teachers approach technical change and the dynamics involved within the context of the classroom. Teachers' perceptions of the Internet, of school district support through training and equipment, and of the capabilities of the students they teach are the substance of their constructive activities regarding Internet technology that shapes each teacher and, in turn, that each teacher shapes. Furthermore, differences in the definition of access between teachers, schools, and districts present a conundrum for constructivist teaching methods as they are employed in Internet classroom activities. This lack of consensus within the employment context of teachers and the influence of teachers' perceptions can create barriers to actual use even in the presence of established classroom Internet access.

Through personal interviews as well as observation, I categorize the perceptions of teachers using a descriptive framework that identifies three different groups of Internet users, or "relevant social groups": Refusers, Trained Non-users, and Users. Criteria for group designation are based on a teacher's actual Internet use to enhance lessons, and on the innovations he or she exhibits to overcome contextual obstacles like district policies and practices, lack of equipment, inconsistent training, and insufficient technical support. The resulting data, thus categorized, offer a unique view of the factors that influence teachers' Internet use and the inconsistency across such variables as age and teaching experience, contrary to recent survey statistics. An added benefit of using this framework is the ability to compare groups. This yields sensitizing concepts that can ultimately be included and addressed during continuing development sessions for teachers, and aid administrators in shaping future

technology policy within school districts. In so doing, school districts can approach the integration of technology dynamically through teachers, rather than statically through the mere presence of technical equipment.

In the first section of the thesis, I will introduce the theoretical framework generally known as the Social Construction of Technology (Bijker 1995). Using the author's example of the design development of the bicycle, I will then present the descriptive model and explain the concept of designating relevant social groups according to the meanings they attach to the technical object, or artifact. These designations are fleshed out with the theoretical concepts of interpretative flexibility, closure, and stabilization. After concluding with a brief proposal to use disturbances or areas of conflict as topics for pursuing the descriptive model, I will then review the existing literature on Internet use in the classroom to begin building a foundation based on the current degree of knowledge we have acquired through survey methods. Following this in the Methods section I describe the sample, offer my reasoning for choosing a fixed sample, and explain the purpose of using a data sheet in addition to the interview questions.

The findings section is organized under the SCOT concept of relevant social groups. Here I designate the three groups, and describe teachers' experiences with Internet technology according to their perceptions of training, technical support, student capabilities, and their status as employees of a school district. Evidence of teacher perception is used to provide support for several key findings: (1) Nearly all teachers feel it is the school districts' responsibility to teach them to use Internet and computer technology; (2) Teachers do not consider it appropriate to bother on-campus support staff with questions about implementing the Internet into classroom activities, (3) Teachers who report frequent use in the classroom are less impressed with the Internet as a research tool than teachers who have received training but do not use the Internet,

and (4) The presence of a printer in the classroom provides an important link to Internet use. In the final section, I return to the topics as they are presented in the review of previous literature. Several of the findings in this study contradict the results of national surveys, while others serve to enhance or offer qualifications of previously reported research. A common thread throughout this thesis and the motivation behind this study is that differences in definitions of access, between teachers and those within the context of the teacher's workplace, has an impact on Internet use, and has not been adequately captured by previous surveys. I will address this with a discussion of the implicit meaning of constructivist teaching methods particularly in the context of the finding that many teachers feel it unfair to assign Internet homework. I conclude with a brief discussion on the future of professional development.

1.1 Requirements for a Theoretical Framework

Wiebe Bijker (1995) presents the Social Construction of Technology (SCOT) as a tool for identifying and analyzing the complex and contingent relationships between those involved in the technical development of an artifact[2] and its evolution through users across time. He sets forth four requirements for a theoretical framework: "It is able to account for change and constancy; it is symmetrical with respect to success and failure; it encompasses actors' strategies as well as structural constraints; and it avoids the implicit a priori assumption of distinctions" among the social, political, economic, and scientific elements (p.192).

Using the example of the evolution of the bicycle, Bijker explains, through a series of descriptive accounts akin to "storytelling," how the first design limited riders to brave or foolish

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[2] An artifact is considered to be an object of invention or development that gets its "working" identity from the ways different groups use it. An artifact does not inherently "work" in and of itself. Its meaning or use is socially constructed and so is contingent upon the meanings attached by its users. A developmental process is also considered to be an artifact. The evolution of a developmental process will necessarily pass through success and setback alike according to the social meaning attached by certain groups of users. According to SCOT, success and setbacks are relative terms in this context and gain their definitions from a consensus among like-users in tandem with the intended objectives of the developer. To say that a process or artifact is a success because it "works" is misleading under this theory (Bijker 1995).

men willing to risk severe injury because the bicycle was up high off the ground and had no brakes. In addition, these men were in the upper classes because of the cost of the bicycle. Women could not ride because their skirts did not allow them to mount or ride without getting tangled and any other mode of dress was considered improper. As men took to the streets and sidewalks on the new contraptions, walking citizens were put into danger of being run over and quickly developed the attitude that this group of bicycle riders was a public menace. Ordinances were then instituted governing where and when such riding could take place within the city limits. Clothiers began working with women to develop acceptable cycling attire that would allow women to become riders too. Pantaloon-type garments became popular as a result, thus changing the way women dressed and the activities that were open to them.

Though this is an overly-simplified version of Bijker's example, it illustrates the interaction of the scientific technology (the bicycle) with social and economic features of the intended users (men of means) as well as the politics that acted as a constraint (women did not wear pants) and occurred as a result from the non-users (ordinances and pants for women). Thus, a central concept in the social construction of technology stresses the contingent interaction among the developers and users of technology, as well as the non-users, as they are constrained by societal, political, economic, and scientific elements. It includes those who seek to promote such technology, whether they are the engineers involved in development of the artifact, the facilitators of groups of users, or individuals. It is this contingency factor that calls for the use of qualitative methods over mere prediction in studies of technical change.

Bijker's bicycle example shows that contingency is the crossroads of structural constraint on technical development. Under what conditions does a technical artifact gain stability through use by actors? How do the users of technical artifacts contribute new meanings to the artifact?

Bijker's answer is to deconstruct the artifact both historically and sociologically. Taken down to the "nuts and bolts" level of design development, the analyst may begin to put together a picture of that development as it has been influenced structurally. Bijker tracks this development by examining the rhetoric of timely advertisements, historical accounts in monographs, and "taking a step back" to see the bigger picture. Rather than simply focusing on the succession of different bicycle designs, he instead looks for the reasons that the designs had changed, or in some cases, had not. In other words, why did certain design-features of the bicycle last, while others were relatively short-lived?

When the height of the wheel was lowered for safety, women could then physically ride, but they were still constrained by rules of proper dress for women. Over time, advertisements for women's cycling attire attest to the changes in perception taking place in society toward what is considered proper dress and recreation for women. A turn of the phrase or the attachment of a descriptive word like "sporty" to an advertisement for pantaloon undergarments had the power to influence some women to buy the garments and become bicycle riders. Of the women who chose not to ride, some of them would buy the undergarments for other activities of a "sporty" nature. Economically speaking, women became a new marketing target for both the developers of bicycles and the retailers, thus expanding a population of users that included only men and changing the boundaries of the previously non-using social group that was comprised of women.

To summarize briefly, through the identification of the various social groups relevant to the artifact, the analyst can then begin to deconstruct the artifact into the different meanings given it by the various groups. A descriptive or technical frame is developed that describes the context of the particular group in relation to the artifact as being constrained by social, political, economic, or scientific elements. In the next section I will examine the descriptive model as it

represents both a methodological tool for research and a format for explanation in the SCOT approach. The descriptive model is used in present research, with specific emphasis on the identification of relevant social groups and the interpretive flexibility these groups exhibit in relation to Internet use in the classroom.

1.2 Relevant Social Groups

The descriptive model for SCOT is the means through which case studies are organized to allow for comparison and generalization across technical artifacts, processes, and change. The descriptive model provides the means to add the dynamic dimension to otherwise static accounts of technical change through identification of "relevant social groups," and determination of their boundaries. Identifying and describing these groups can be accomplished "by following two rules: 'roll a snowball' and 'follow the actors' (p.46)". The snowball method allows the researcher to interview a limited number of actors and inquire at the end which other actors should be interviewed. As more and more actors are interviewed, the number of new actors suggested for interviews will decrease until a complete set of all those involved has emerged. In this same way we can determine the social groups relevant to an artifact by making note of all groups mentioned in connection with that artifact.

After having identified the initial group, following the actors will offer details that allow the researcher to further describe group membership according to the boundaries that have emerged. In the bicycle example, the initial group was composed of brave men who rode the bike. Through analysis of timely rhetoric, descriptions indicated they were considered brave, young men of means who sought to impress others with their daring. The groups' boundaries included no women, old men, children, or cowards. Boundaries also delineate one group from another as do the groups' perceptions of the artifact itself.

"Relevant social groups do not simply see different aspects of one artifact. The meanings given by a relevant social group actually *constitute* the artifact. There are as many artifacts as there are relevant social groups; there is no artifact not constituted by a relevant social group" (p.77). Although it may seem as if we are opening ourselves up to a "pluralism of artifacts" this is not as it will stand. Bijker posits that it is necessary to deconstruct the artifact into different artifacts before one is able to explain how they develop and under what conditions one may "peter out while the other becomes dominant" (p.77). The following paragraphs will help to explain how this "pluralism" occurs, what to do with it, and finally, how it will be naturally absorbed through the process of closure and stabilization.

1. 2.1 Interpretative Flexibility

Identifying relevant social groups is the analyst's starting point in researching the design development of an artifact. In this stage, the artifact is described "through the eyes of relevant social groups" (p.73). Another aspect of the descriptive model seeks to understand the interpretative flexibility of the artifact between groups. In the bicycle example, one artifact has several relevant social groups including the non-users. Each group attaches different meanings to the artifact. While the thrill seeking young men bought the bicycle because of the risk-attached features of the large wheel, another group bought the machine because the large, high wheel kept them out of puddles even though they did not care for the risks associated with getting on and off the bike. The non-user group viewed the bicycle as being unsafe. For the first two groups we would consider the machines to be "working" in that they serve the purpose for which they were purchased, evaluated, used, etc. For the latter group of non-users, the machine did not work. This "demonstration of interpretative flexibility sets the agenda for a sociological analysis of technical development" (p.77) and satisfies the theoretical requirement of

symmetrical analysis while also guarding against the inclination to allow a machine to take autonomy of its own.

The symmetry aspect (Bloor 1973, 1976) of the SCOT approach is essential for the descriptive model in that it "calls for sociologists analyzing scientific development to be impartial with respect to the truth or falsity of scientific beliefs" (p.75) and serves to further describe social groups relevant to an artifact through their own specification of "working or non-working." It is tempting to focus on the working aspects of a machine and attribute success through the status of that working. However this does not represent an empirical method when dealing with social construction. Both success and failure must be explained by the same conceptual framework, just as the concepts of "working" and "non-working." As we have seen from the bicycle example, it is entirely possible that an artifact may be considered successful by one social group, a failure by another, and successful for a completely different reason to yet another group. Thus far we have identified relevant social groups through their description of the artifact, enhanced the descriptions through interpretative flexibility by determining working or non-working status. We can also use interpretative flexibility to see how variation of problems and selection of solutions within social groups lead to differential degrees of technical change associated with the same fundamental artifact.

Relevant social groups may also determine the working or nonworking of an artifact through the variation of problems they face in connection with use and the selections of solutions to those problems. For example, the introduction of cycling pants presented a solution to the problem for the group of women who could not ride the bicycle because their skirts would tangle in the spokes of the wheels. The artifact then gained working status within that social group. Cycling pants were not a solution for the group of women who would not ride because they felt

the bicycle was dangerous. After several design modifications, the introduction of the air tire allowed the frame of the bike to sit considerably lower, thus making it safe for anyone to ride. The air tire was the design solution for the developers of a bicycle that came to be known as the Safety Bicycle, while the Safety Bicycle itself was the solution for the relevant social group of women who considered the high-wheeled bicycle too dangerous. For the group of brave young men who showed their skill and daring by riding the older, high-wheeled bicycle, the air tire eventually became a problem. This group split. Some members stayed with the older design while others sought the faster, smoother ride offered by the air tire.

Variation of problems and selection of solutions is an aspect of interpretative flexibility that can be used to further describe and delineate groups from one another as well as isolate particular structural constraints that influence social groups. Once the constraints are identified, the groups' solutions are noted. At this point a new working version of the artifact emerges. Remembering the theoretical requirement of analyzing science, technology, and society as a seamless web, care has to be taken to present a description of the artifact in terms of the meaning attached by each social group. If each social group attributes its own meanings to the artifact, thus creating several different artifacts, how do we avoid a pluralism of artifacts that begs the question of theoretical containment?

1. 2.2 Closure and Stabilization

The process of closure and stabilization occurs naturally in the progression of technical change among and within relevant social groups. "Closure, in the analysis of technology, means that the interpretative flexibility of an artifact diminishes. Consensus among the different relevant social groups about the dominant meaning of an artifact emerges and the 'pluralism of artifacts' decreases" (p.86). This is analogous to the process by which scientists reach consensus

after controversy, thereby generating scientific fact. Closure is "almost irreversible" (p.87) in that it involves moving past the original ideas, beliefs, and values attached to the artifact by the relevant social group as they existed within an earlier time frame. Going back to the bicycle example, closure was attained after the air tire allowed for a lower frame height, a chain guard prevented accidents with clothing, and the tire was modified for faster speeds and less vibration. These changes in design both directly and indirectly addressed the constraining influences upon the different groups allowing them to view the emergent artifact with general consensus. That is, the bicycle could be ridden by almost anyone who chose to.

Where closure refers to consensus between relevant social groups that one artifact has reached dominance, stabilization refers to the "development of an artifact within one relevant social group, in terms of modalities used in its descriptions" (p.87). In other words, increasing use of the same rhetorical terms or jargon attached to the artifact within the group will solidify the meanings for the entire group. "In principle the degree of stabilization will be different in different social groups" (p.86). Bijker gives an example of how massive advertising campaigns and bicycle racing promoters made the newer bike practically a household word. Among the group who would actually compete in racing, the degree of stabilization is high. The group consisting of noncompetitive pleasure riders would perhaps have less inclusion in the sport of racing; therefore they would have fewer occasions to develop the racing rhetoric, leading to a lower degree of stabilization. "The combination of stabilization and closure processes makes it understandable that technical change is a continuous process, although not one that occurs at equal rates at every point in time; it is more like a punctuated evolution" (p.88).

At this point I have offered a general, yet adequate, understanding of the SCOT framework. To briefly review the requirements of the theoretical framework, it must be able to

(1) account for both change and continuity of a technical artifact. Development and creativity are seen as a social process rather than a psychological one and are constrained by economic, political, and scientific structures. (2) Symmetry in respect to success and failure must be explained by the same conceptual framework. "The working of a machine is not an intrinsic property of the artifact, explaining its success; rather, it should figure as a result of the machine's success. In a symmetrical explanation, "working" and "nonworking" will not figure as causes for a machine's success or failure," instead they are "nonintrinsic but contingent properties" (p.15). The theory should (3) "combine the contingency of technical development with the fact that it is structurally constrained; in other words, it must combine the strategies of actors with the structures by which they are bound" (p.15). (4) "Modern society must be analyzed as a seamless web" so as "not to compel ourselves to make any a priori choices as to the social or technical or scientific character of the specific patterns that we see by applying it" (p.15).

1.3 Disturbances as a Starting Point

The final aspect of the descriptive model involves the methodological concept of using "disturbances" as a starting point. The term "static" has been used to describe the existence of the artifact without considering the human contingency element that includes the concept of interpretative flexibility. For the researcher, observation alone is not capable of producing the dynamics involved in the formation or existence of relevant social groups. The identification of relevant social groups can offer a starting point, yet to dynamically illustrate the differential meanings each group attributes to the artifact in question it is helpful to focus on disturbances or problems within the group and the solutions that are selected. This will be the approach taken in the present study. Teachers' Internet use in the high school classroom is analogous to the differential uses of Bijker's bicycle. The process of implementing the Internet in high school

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classroom activities corresponds to the design development of the bicycle. I turn now to a

review of existing literature for the questions that will allow the designation of relevant social

groups and expressions of interpretative flexibility among teachers.

CHAPTER 2. REVIEW OF LITERATURE

The literature on the impact of Internet technology on professional educators stresses the prediction of Internet use based on teacher characteristics and the importance of technological support in schools. It should be pointed out that important differences exist in the ways teachers use the Internet depending on the grade and subject being taught, especially in this time of transition, and that the use of Internet technology in an elementary classroom is far different from that in a high school situation. Similarly, the level of computer and Internet experience possessed by an entering high school student will vary widely at this point in time, depending on the connectivity and innovation of the primary school attended. Until computer and Internet technology is a required and standard part of the primary school curriculum, high school teachers will be faced with varying levels of proficiency in students, which will impact the ways, frequency, and confidence with which they will embrace the Internet in the classroom.

2.1 Predictors of Teachers' Internet Use

Previous studies indicate that certain characteristics or conditions are useful in determining which teachers will be more apt to use the Internet in the classroom and, thereby, pass their experience along to the students through implementation of necessary navigational skills. One such study involves a 1998 national probability sample of teachers from grades 4-12 in both private and public schools. Becker's (1999) study shows three major predictors of teachers' Internet use: connectivity, computer expertise, and constructivist pedagogy.

Classroom connectivity refers to whether and how teachers are able to access the Internet. According to Becker, direct access via modem, LAN (Local Area Network), or WAN (Wide Area Network) is the most important variable in predicting Internet use. Though teachers did not report this to be necessarily valuable, the respondent's frequency of Internet use in the classroom

reflects this finding. Considering the degree of student research assigned and the level of classroom connectivity,[1] Becker predicts that as more classrooms are connected to the Internet, more teachers will assign student research, and use the Internet more frequently for classroom preparation.

Computer expertise is the strongest indicator of Internet value where teachers with more experience using computers are apt to report that the Internet is essential to adequate teaching rather than simply representing a valuable tool for enhancing classroom instruction. It is important to distinguish here between computer use and Internet use. Computer use includes word processing, spreadsheet or other programs, and general knowledge of files, menus, and terminology. Internet use is seen as navigating the World Wide Web or using email accounts, list serves, etc. Teachers who have prior positive experience with computers are most apt to visit the Web on a regular basis,[2] transmit the value of the Internet as a research tool to students, and hold the belief that in order for their teaching techniques to be beneficial to students the Internet must be incorporated into daily classroom practices.

The third major predictor of Internet use in Becker's study is that of constructivist pedagogical beliefs and practices. As he warns, this is one area that schools or policy makers are unable to control. Over the last century, scholars have been debating the merit of traditional skills-based teaching in which mastery of common knowledge is held to be essential with that of process-based teaching in which critical thinking and higher order cognitive learning is the goal.[3]

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[1] Teachers highly valued Internet access in the classroom rather than seeking out access in another part of the building.

[2] While prior experience is a valid indicator of a teacher's Internet use, the determination of how much use constitutes a regular basis may be subject to interpretation as more and more schools are linked to the Internet. Research regarding access in schools is heavily dependent upon the advances made by the schools themselves to install equipment and adequate access to the Internet. It may be wise, at this point, to remember that regular use is a relative concept that applies to the timeliness of the particular study, and is not a static concept.

[3] For a thorough understanding of the historical significance of this ongoing debate see E.D. Hirsch. Cultural Literacy: What Every American Should Know. (1988).

The fundamental difference between the two pedagogical beliefs that Becker sees as pertinent to this research is that of "teacher-talk," which means that under a traditional teaching style[4] the teacher is doing most of the talking while students are expected to learn by listening. In contrast, constructivist methods encourage students to learn through the process of problem-solving that involves critical thinking, often done in group situations. This places the teacher in the role of facilitator rather than that of the ultimate center of knowledge in the classroom.

Pedagogical beliefs may well be the proverbial brick wall in that educational philosophies have been instilled in teachers throughout their college training and reflect the consensus of the dominant culture of that time as reflected through college curricula. Hirsch (1988) points out that in the past, colleges of education have presented a somewhat static view of learning to teachers-in-training. This represents a traditional method, and colleges have been slow to adopt more progressive curriculum. This product is evident across all schools that share a composition of teachers with varying lengths of teaching experience. What has been considered wisdom through experience may, in the case of embracing Internet technology, turn out to be a point of delineation. Becker warns that "diffusion of Internet use to larger numbers of teachers will reach a barrier when most of the remaining non-participants hold beliefs that are not as compatible with Internet use as constructivism seems to be" (1999:32).

In addition to predicting Internet use among teachers by examining the above characteristics, several other factors have significant relationships to Internet use. A teacher's level of informal contact with other teachers at school, as well as having Internet access at home is an important predictor of using the Internet in a professional capacity. Having a school-supplied computer on the classroom desktop enhances both of these factors by supplying the

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[4] Traditional teaching involves skills-based curriculum, organized in a fixed, externally-determined sequence, taught through an aggregation of content, which all students should master (Becker 1999). Also see Hirsh 1988; Finn 1989.

means for initiating conversation about teaching ideas or materials either found on-line or used for student assignments on-line. Teachers' satisfaction with being able to offer input and service in decision-making processes that involve new technology or curriculum has been linked to the level of enthusiasm they show for change and reform (Cuban 1986; Corcoran 1990; Dawson 1985; Hodas 1993; Schofield, Davidson, Stocks, & Futoran 1997).

Finally, teachers' age, years of experience, and extent of professional development activities predicts which teachers will be more apt to use the Internet in the classroom (Becker 1999, Rowland 2000). Becker finds that younger teachers are more comfortable with technology and this level of comfort "outweighs advantages of greater teaching experience" (1999:30).[5] Smerdon et al. (2000) report that among those teachers with Internet access at home, younger teachers will go on-line to collect lesson plans and gather instructional materials more frequently than more experienced teachers. Rowland indicates that those with three or fewer years teaching report feeling well prepared to use this type of technology. She adds, however, that teachers of all ages who have attended professional development activities report feeling better prepared to use the Internet for instruction than those who attend few or no development activities. While Becker's work focuses specifically on Internet use, Rowland's analysis includes both Internet and computer use, which serves to inflate the statistics pertaining to the Internet alone.

2.2 Technology Support and Professional Development

How teachers perceive their technology support staff will affect the frequency, extent, willingness, and enthusiasm for the integration of the Internet into individual classrooms. Technology support involves placement and maintenance of equipment, instruction in the use of such equipment, availability of staff to answer questions pertaining to equipment use, and integration of Internet technology into the existing curriculum. In other words, technology

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[5] My research does not support this statement and I return to this point in the discussion of findings.

support can be considered a responsibility of the individual school in assisting teachers to utilize the available equipment. Professional development, on the other hand, places emphasis on the teachers themselves, to attend workshops, pursue higher education, participate in independent study courses, or keep abreast of advances in education through trade journals or educator cooperatives.

Where professional development requires action on the part of the teacher, those teachers usually look to the school or the district to provide opportunities or incentives to attend such events. Incentives may be promotion through obtaining an advanced degree, an increase in pay scale based on degree status, or even the perception of increased respect among colleagues. These types of incentives require personal commitment and motivation, since the pay-off is individual acquisition of rewards. To the contrary, opportunities to learn a technological tool that threatens to replace the sanctity and safety of the bound text, for some, must be presented and initiated because there appears to be no inherent reward for acquiring this information. For example, recent graduates of education programs are familiar with the catch-phrase "lifelong learning" that tacitly links the rewards of being an educator with the desire to remain theoretically and technologically current. However, this concept presents a conundrum for teachers whose education and life experience precedes that of Internet technology. These teachers will naturally look to the school to arrange the opportunities for technology training and advancement while gauging their perception of support received by the degree of practical development available to them.

The intensity or frequency of development opportunities is essential to the feelings of preparedness expressed by teachers according to the National Center for Education Statistics. "Less than one third of teachers felt very well prepared to integrate educational technology" into

the classroom. Less experienced teachers reported feeling more prepared than their more experienced colleagues (1999). Recent professional development[6] has been found to significantly affect whether a teacher feels adequately prepared to integrate new technology into the curriculum, as has intensive training sessions that last more than one day (Rowland 2000; Ronnkvist et al. 2000).

Potential barriers to obtaining this degree of development include securing release time from duties to seek instruction, inadequate computer facilities for training sessions, conflicts with scheduling after school or weekends, and perceptions of inadequate technology support within the school (Smerdon et al. 2000). These barriers may actually interact to perpetuate feelings of non-support from employing schools or districts. Moreover, the on-campus technology support department usually consists of teachers, some full-time, but most part-time. These individuals are also constrained by the barriers to development as they try to teach students, repair equipment, load software, and attempt to design training workshops for their peers.

2.3 Survey Approach vs. SCOT

While prediction of Internet use by teacher characteristics is typical of sociological studies, there is little value in predicting in the context of teachers' use unless we view it through "socially constructed glasses." More experienced teachers may believe that new teachers are privy to Internet technology through college training that was not available in the past. This may cause them to think they are lacking the proper technology credentials necessary to give them the status of "experienced" users, thus causing them to underreport their level of experience and undermining their feelings of preparedness relative to their younger counterparts. Additionally, younger teachers may report feeling better prepared to use the Internet, but it is also possible that such feelings of preparedness preclude practical classroom and teaching experience. Put another

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[6] At least thirty-two hours within the last three years.

way, older teachers may have developed an expressive reserve through maturity in regard to reporting their abilities or feelings of preparedness while younger teachers are feeling the "confidence of youth."

Becker's predictions and Rowland's treatment of preparedness make the implicit assumption that Internet access, youth, and feelings of preparedness lead to Internet use in the classroom. According to the SCOT perspective, this assumption ignores the possibility of political influences within a hierarchical organization, underestimates the social implications of greater amounts of teaching experience, and fails to consider that the definition of the Internet is different for different users.

2.4 Special Programs and Experimental Research

According to the available literature, much of the Internet research in public schools is conducted through the implementation of special programs funded by grants. The results of such studies often reflect an unrealistic inclusion of equipment and technological support, unavailable to most public school systems.[7] Further, the average high school teacher is underrepresented in the population for these studies, which are usually aimed at Primary levels, Gifted, Advanced Placement, or Mentoring programs. While such research is certainly warranted, it is crucial to make the distinction between the experimental environment and the public school environment.

The experimental environment places all the necessary equipment at the disposal of teachers involved in the program. The budgetary considerations of the grant proposal have calculated adequate technical support as well as timely support for teachers due to time limits for

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[7] "Common Knowledge: Pittsburgh" is one example of a project designed to *stimulate* Internet use in instructional activities. The focus on intensive technology support offered to participants gives evidence of the extent to which special programs are designed to *stimulate* interest among teachers thus creating more of an experimental environment than a realistic public school working environment. Schofield,, Davidson, Stocks, & Futoran. (1997). The Internet in School: A Case Study of Educator Demand and Its Precursors.

research projects. For example, problems with computers are corrected by program personnel who have a vested interest in the success of the program as evidenced by the funding opportunity. This equipment is unlikely to be placed on a waiting list for repairs. Public school districts do not share this condition in daily operations. While schools and teachers have procedures to follow that specify action will be taken on repairs, the reality is often quite different. As teachers have indicated in preliminary interviews they do not, nor cannot, expect timely repairs: their experience or that of other teachers has proven this to be a rare occurrence.

The technology support that experimental programs offer the individual teacher is also not reflected in the public school environment. Special funding allows teacher-participants to receive more immediate and full-time instruction from program staff. Participants operate under certainty that program staff are there to be utilized. Special programs allocate personnel to be available on a constant basis for help, unlike public school technology departments that are staffed with colleagues under the same district constraints. The teachers in the present study indicated solidarity with technology personnel in their own school and often justified the lack of action by the constraints of staffing. Thus, it becomes somewhat commonplace for teachers to operate under the assumption that their technology support staff is doing the best they can with the resources available to them. Following this line of thought, almost all the teachers interviewed did not consider it appropriate to bother their support staff with questions about implementing the Internet in classroom activities.

Using special programs as indicators of successful integration of the Internet into public schools does not mean such programs bear no relationship to public schools' technology implementation. Rather, they offer valuable insight into the need for increasing the scope and depth of technology departments in public schools, at least during these transitional years when

the Internet and computer technology are not evenly distributed among teachers. There are, however, inconsistencies in education and resources, including teacher education, across certain demographic areas. These include the South, inner-city, and rural locations that make the Internet transition somewhat unique to each school district.

Rather than viewing teachers' Internet use as a broad, universal phenomenon, a view that characterizes previous research, I will consider the social, economic, political, and scientific influences on Internet use as contingent factors and focus on offering descriptive frames that include the context of the teacher's workplace. I define relevant social groups of teachers according to actual Internet use in the classroom. The groups are then described by the common problems they face with technology implementation and support, and solutions they find to overcome these problems. Finally I discuss the definitions of the Internet as either "working" or "non working" for the particular group. Previous research offers a foundation on which to base questions designed to encourage teachers to open up about their unique experiences with Internet technology. In the next section, I deviate slightly from Bijker's methods, offering my rationale for using a fixed sample instead of "snowballing", but allowing enough latitude in the scope of the questions to "follow the actors" within the workplace context of the teacher's classroom.

CHAPTER 3. METHODS

3.1 The Sample

Data for this study were gathered through semi-structured interviews with English teachers from five urban public high schools within two school districts. Two of these districts were in Texas and three in Louisiana. Demographically similar, the school districts serve mid-sized cities and the high schools represent the same basic minority/reduced lunch statistics[1] across districts. Both school districts claim an active commitment to technology, operating district technology centers that offer additional teacher training for a nominal fee.

The sample consists of forty-six interviews from a possible fifty-four teachers (85%). Males account for 13% of the sample, while females represent 87%. Racial proportions are 15.2% African American and 84.8% White. Most respondents (87%) report Internet access in the classroom and 80.4% have home computers with active Internet accounts.[2]

English teachers were asked to participate voluntarily during a free period, before, or after school at their convenience.[3] The decision to use English teachers is based on the following reasoning: First, since the data are organized under the SCOT concept of relevant social groups, it makes sense to interview teachers within the same departmental or curricular context. Second, all students are required to take four years of English, such that teachers in this department have contact with all the students in the school. Third, English is a subject that offers many different areas of opportunity for using the Internet: seeking literature sites, online discussion groups,

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[1] Public schools receive federal funding based on the number of students who qualify for the reduced or free lunch program. Parents' income and family size are criteria used to determine qualification. This percentage is commonly used in describing poverty levels among schools and districts to gain government assistance or qualify for grant-funded programs.

[2] The presence of a home computer does not necessarily indicate a teacher's use of the Internet. It has been found that teachers report computer ownership on a household basis, not a personal basis. For example, a home computer may be used by a spouse or children rather than the teacher. As this study shows, Internet access does not equate to actual Internet use.

[3] These are the guidelines established by the school board granting permission for this study.

graphics to enhance projects, and research papers. Finally, English teachers were chosen

because they characterize educators whose subject encompasses the reading and writing skills

that represent a prerequisite to basic Internet navigation and understanding.

The data were collected through the use of a supplemental data sheet and semi-structured

interview. At the initial department meeting, a data sheet was distributed with general

demographic questions pertaining to age, race, marital status, number of children, degree held,

year of degree, and years of teaching experience. Substantive questions involving home

computer ownership, the presence of a computer in the classroom, Internet access at both

locations, the proximity of a printer at school, average weekly hours of Internet use, and primary

reason for using the Internet, was included. These data provide the supplemental material for

describing the relevant social groups.

I also inquired if computers at home or school were in proper working order. Since much

of the existing information on teachers and Internet use was gathered from surveys conducted by

entities that serve the Department of Education, it seems possible that teachers may have felt

pressured to present themselves in a favorable light. In addition, standard survey questions about

computer ownership may only offer a yes or no response set that does not determine if the

reported computer is actually working. If it is not working, has that particular teacher made the

effort to have it repaired? How long has the computer been down? These details give a sense of

the importance of use of Internet technology to the teacher as well as opening up dialogue as to

the perceived accessibility of the technology staff at the school.

3.2 Interview Questions

The follow-up interviews took place either in the individual's classroom or an available

department office, and began with a brief review of the questionnaire responses. During the

interview, teachers' perceptions of their peers were gauged by asking "Think about other teachers you know (anywhere) -- how many of them would you say use the Internet?" A five-item response set was offered to determine that particular teacher's assessment of the extensiveness of Internet use within the profession and to encourage comments about their own progress in relation to other educators. Teachers who indicated comfort using the Internet were asked how they viewed their colleagues who seemed reluctant to use the Internet. Those who reported reluctance were asked how they felt among their more experienced peers. They were also asked whether they felt they had the professional respect of their peers, if they would prefer peer training to instructor training, and if they would feel comfortable learning how to navigate the Internet alongside students. The aim of these questions is to determine what type of atmosphere exists among teachers of varying degrees of skill. Can new teachers be helpful to more experienced teachers concerning Internet training or does lack of skill translate into discomfort or resentment? What happens to a teacher's sense of authority if he or she knows the students are more familiar with the Internet than they are?

Several questions address where and when preparation and grading take place, how often students are scheduled for the computer lab, teachers' beliefs about student capabilities and needs, their perception of problems with Internet access in the classroom, ways in which access might enhance their job, and whether they use or contribute materials to teacher sites on the web. These topics allow us to form a clearer representation of the extent to which teachers use the Internet and how they may have integrated this type of technology in their teaching. On the other hand, some teachers may feel that their students do not have adequate Internet access and will refrain from assigning work that necessitates it. Teachers' opinions of students' capabilities concerning the Internet may be a contributing factor in the degree of technological

implementation that takes place in a particular classroom or school. Additionally, if teachers have reservations about misuse of computer equipment or the Internet, they may not be as apt to encourage student involvement.[4] It was my intention to encourage the teachers to talk freely, avoiding yes or no answers, so that the interviews would produce a variety of views and responses that would allow us to categorize them into relevant social groups and, thus, shed more light on possible issues concerning the transition from traditional to technological.

Finally, questions pertaining to technology support within both the school and the district were broached. What type of training had they received over the past year and what training do they believe they require, through either in-service programs or other training available within the school district? In-service programs require mandatory attendance and consist of a series of workshops on different topics within each school. How many in-service workshops are devoted to computer training, Internet navigation, or technology implementation over the course of a school year? Are the topics timely in regard to available equipment? Are computers available to all teachers attending workshops? Are the workshops designed to address different levels of computer experience? The responses to these questions are likely to lead to dialogue indicative of perceived support of both the on-campus technology department and the school district itself as a funding agency. Questions concerning the possible cost of training and scheduling considerations should also enhance a tone of perceived support as well as offering an illumination of teachers' sense of time constraints toward professional development.

The purpose of using a semi-structured interview format was to capitalize on topics from previous survey research, allowing teachers to converse freely about issues regarding Internet technology in the classroom. While the interview questions appear to be in a structured format,

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[4] Interviews indicate that some teachers feel certain that students will destroy computer equipment if allowed to use it on a regular basis.

the actual inquiry makes them more open-ended and encourages teachers to expand on their responses. For example, when the respondent answers the question "Do you feel you have the support of your school district where classroom Internet implementation is concerned?" the next question may be "How could they provide better support?" If equipment is mentioned, I may use this opportunity to ask several related questions before going back to the topic of district support. In this way teachers may become more familiar with the overall topic and offer opinions that indicate their attitudes and dispositions to Internet technology in the classroom. This may be the first opportunity they have had to voice their opinions on a one-to-one basis. Allowing teachers to complain or go off on tangents can be a valuable source of information; hence we utilize Bijker's suggestion of investigating "disturbances". It is during these times that we are likely to discover differential meanings of access as they emerge from the words of teachers in relation to the actions of colleagues, employing districts, and the technology departments that act as intermediaries.

The methods I have chosen to use in this study, while suiting my purpose, may also put forward limitations that need to be acknowledged. Though I have explained the rationale for using English teachers, it is possible that a study involving teachers of all subjects would turn up additional information. Previous research has indicated that some subjects are more applicable to using Internet technology than others. The central focus of this study is on the teachers rather than the subject being taught. Future consideration should be placed on using the same methods for other academic departments.

Comparison across technical frames, i.e. the contextual influences of the teacher's workplace, is another area open to future research. It has been my intent to bring to light that structural influences play a significant role where Internet technology in the classroom is

concerned. The common perceptions of the various types of district support and meanings of access, on the part of both teachers and school districts, offer valuable indicators that can be employed in research that seeks to bridge the gap between micro-level and macro-level studies of education and the agents of education. This is attainable by placing less emphasis on teachers' characteristics and more on the characteristics of interrelationships between teachers and the classroom workplace. It is toward this that my research provides the groundwork.

CHAPTER 4. FINDINGS

Thus far we have seen how Bijker categorizes relevant social groups using the example of the bicycle. A review of the literature on teachers' use of the Internet provides the topics upon which the interview questions will be based. In the methods section, I have described the sample and explained how I will apply the SCOT perspective in this study. The following section is organized under the SCOT concept of relevant social groups.

Within the context of their high school English classroom, teachers described their experience with Internet technology according to their perceptions of training, technical support, student capabilities, and as employees of a school district. They exhibited interpretative flexibility in the various forms of Internet use or non-use and offered innovative solutions to problems that would otherwise limit their ability to use the Internet in the classroom. In some cases, responses also indicated areas of controversy, previously underreported, and pointed out influential variables. The presentation of findings, seen through the perspective of relevant social groups, offers a teacher's view of Internet use in the public high school classroom.

4.1 Relevant Social Groups

The findings suggest three relevant social groups: Refusers, Trained Non-users, and Users. The Refusers had the smallest membership amounting to approximately 10% of the sample, while Trained Non-users and Internet Users groups contained 40% and 50% respectively. These percentages represent only the sample I have chosen in this study. One of the reasons for using the SCOT approach is that school districts across the nation operate under different circumstances that make the teachers' context somewhat unique to each district or technical frame. Additionally, group membership is not static, but dynamically based on influential factors within the classroom context.

The presence of desktop computers in the classroom is one example of variability among individual schools or districts. In the present study, all forty-six teachers had at least one classroom computer. The teachers with more than one computer were those who teach gifted or honors classes that are generally smaller in size than regular English classes. In these cases, the average was approximately four computers per ten students with an additional computer on the teacher's desktop. The only exception was a "virtual classroom" that had ten computers, although these computers originally came from an English computing lab that had been discontinued. Teachers indicated that students can use this virtual classroom, during certain hours, in much the same way they would use a computer lab, and that the rearrangement and subsequent designation as a virtual classroom was perceived to be a source for media hype by the school district. Teachers reported 87% of classrooms had Internet access.

4. 1.1 Refusers

Following Bijker's format, relevant social groups can be initially identified as users and nonusers. Among the nonusers are teachers who refused to learn the Internet as well as those who had received training but still did not use it. Four out of five high schools that were visited employed teachers who were within five years of retirement and refused to learn the Internet. The "Refusers" did not attend the initial department meeting for these interviews and when tracked down, they indicated that they were aware of the subject of the meeting and felt they had nothing to contribute to the research. The subject, as they knew it, was Internet Use Among English Teachers and it became apparent that they did not consider their lack of interest to be relevant to the study. This seems to indicate a negative connotation associated with non-use that is held by more experienced teachers. Their reluctance to participate was judged by colleagues to be based on their being "set in their ways" and/or "afraid of change."

I think that's their prerogative (laughter). I think the majority of the younger teachers who are coming in are doing themselves a disservice if they don't become familiar with the Internet and be able to use it fluently. Now, this is my 28th year and if I choose not to do that – if I did not have one at home, it's not a big deal. If they've done things in a certain way for thirty years they know what they are doing. They're going to continue to do that right up till they retire.

I see the resistance. They are already in a routine, but I also see it not just with computer use, but with some of the textbooks we get in or the new format from a new principal. They resist that change. They think they have everything they need to know.

It's a fear factor – the fear of the unknown. Technology, though it's been around for a while still scares people and they don't realize you can learn a lot from the kids. I feel comfortable asking students, but some teachers feel intimidated -- they don't want their kids to know they know less than them.

In all cases, however, colleagues reported the Refusers to be excellent teachers and capable of offering the same degree of education to students as those teachers who regularly used the Internet.

An obvious problem facing the Refusers was what to do with in-service training that takes place periodically. An in-service day requires teachers to report to school while students have the day off. Generally, mini workshops are conducted by peer-teachers or group training is set up at the district technology center. The most popular solution for avoiding in-service training is taking a paid sick day. Teachers are allowed approximately ten days paid sick leave each school year and are not usually required to give any reason other than personal illness to school administrators. When they do attend workshops, some members of the Refusers can be observed reading novels, writing letters, grading papers, or balancing checkbooks. If faced with a hands-on computer workshop, these teachers will remain in the background, usually looking over the shoulder of the one at the keyboard since most sessions require group work centered around one computer.

When we came on-line with our attendance program, we stayed after school, but they were still getting it set up and it was too crowded. They had about fifty people and only

25 computers. I never learned it. I didn't have my hands on a computer. In fact, two of us were looking over a person's shoulder. The one who learned it was the one on the computer. I have to actually do things to be taught. If I practice it I will learn it. I did not get the chance, so they didn't implement the program because nobody was really trained.

For the Refusers, Internet technology in the classroom does not work. The largest part of their teaching career has been based on traditional teaching methods that have allowed them to achieve successful performance evaluations without Internet technology. These teachers have indicated they would likely retire rather than submit to mandatory Internet training.

4. 1.2 Trained Non-users

The second group of non-users is called Trained Non-users. This group of teachers reported levels of computer and Internet experience from that of beginner to advanced. The number of years teaching varied from one year to thirty-five years. For various reasons Trained Non-users have reported that, while they have used the Internet in the past, they have not used their Internet access in the classroom in the past twelve months with the exception of using an online attendance program that was required. When asked how many teachers used the Internet in their opinion, the response was overwhelmingly that "most" or "all" used it. "[It] makes me an oddball at school -- I'd rather spend my time reading" stated the one teacher who openly admitted hating the Internet. Interestingly enough, teachers who felt less confident about their Internet ability and had little or no logon time seemed to perceive that other teachers, in general, were using the Internet in the classroom on a much more frequent basis, and that those others were more accomplished users.

While Trained Non-users cited reasons of inadequate equipment, slow repairs by technology staff, lack of time, poor training, and frustration, they also saw the Internet as being valuable to education. A member of this group described the Internet as "a fantastic resource for

teachers – with one site that is just fabulous, but I wouldn't know how to do it, so I've got to get somebody to do it." Another teacher alluded to the frustration that teachers face in a time-demanding job that offers relatively low pay;[1]

> I think it's [the Internet] highly effective. If I'd practiced it, I'd know a lot, but I was introduced to tons of sites beneficial to me teaching English. I have no time during the school day and don't feel like it at home and since I don't have a computer at home, I can't. [Computers] are expensive and it's my understanding that they change so fast I don't want to get stuck with a slow turtle when a month later there is something new.

That this group believed the Internet to be valuable to education, and that they did not use the Internet in the classroom although they have some degree of training is paradoxical and presents the opportunity to focus on "disturbances" as we describe the group. These areas of disturbance come by way of individuals' experiences with Internet technology within the context of the teachers' workplace. As I show, the perceptions of Trained Non-users toward the school administration, school district, technology support staff, students, and Internet technology combine in ways that negatively influence the use of Internet technology in the classroom.

Teachers in the Trained Non-users group considered their department supervisors and the school district responsible for providing equipment and training "if they expect us to use it [the Internet]." While having access to the Internet is obviously a primary consideration influencing use in the classroom, those teachers with desktop computers indicated they would use the Internet more if they also have a printer in the classroom. Among the teachers interviewed, more than half responded that being able to print materials found on-line is the benefit of having the Internet in the room. One teacher who admitted to not using her desktop computer for anything but attendance went on to say "Now if I had a printer that would be a whole different story.

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[1] The salary for teachers in Texas and Louisiana is currently below the national average. In 2000, Texas teacher salaries ranked 37th in the nation while Louisiana salaries ranked 45th. Teachers' relative standard of living (salary compared to per capita consumer income) is at its lowest in 40 years, while average salary increases are among the smallest in 40 years of data reported by ATF. Survey & Analysis of Teacher Salary Trends 2000. American Federation of Teachers, AFL-CIO available online at http://www.aft.org/research.

Then we could get information off of it that they [students] could use and I could have it copied." Another explained that being five rooms away from the department printer made it impossible for her to use and simultaneously print material from the Internet. "I couldn't do that during class. I have to do it during a conference period or after school. I've got 30 freshman and they are just wiggle worms. You can't take your eyes off them." Indeed, while I was set up in the English office conducting interviews, two days in one school and three days in another, I observed only one teacher from each school pick up material from the printers. Indicative of teachers' concerns, one woman tried unsuccessfully to print on the department printer from her classroom throughout the course of the day. During the interview we heard the printer make all the appropriate noises, but produce no paper. Shortly after, the teacher came in, found no paper copy, checked the machine for paper, looked for other obvious technical problems, gave up, and returned to the classroom to try again. This action was repeated five times.

Not only is it inconvenient to have to leave the classroom, examples like this contribute to a level of frustration that makes the implementation of technology a chore and sets the stage for future negative feelings about using the Internet at school. "I don't know how you can prepare kids for the real world when you don't have computers in your classroom for them to use and when there is no access to a printer and printers are cheap. I think it's a shame," commented one of the teachers. Generally members of this group have tried to use Internet technology to enhance lesson plans in the past and have met with equipment or technical challenges that are outside the boundaries of their experience. Rarely will Trained Non-users ask students for help. Though more experienced teachers reported turning to students "who know much more about computers and technology than most teachers", the Trained Non-users often feel this tactic would compromise their authority as the base of knowledge in the classroom. "I would like to be

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a little bit more knowledgeable about something that I am going to use if I'm going to use it in my classroom to help a child" offered one teacher.

Internet access and implementation are contingent upon the presence of equipment and technical support offered by the school district. While school districts provide in-service workshops for teachers to learn to use equipment or navigate the Internet, the workshop may prove to be futile if a teacher does not have the equipment or the time to follow through with practice. For example, one school district conducted workshops on Power Point presentations during an in-service day and one week later nineteen out of twenty teachers who had attended said they would not know how to use Power Point in the classroom because they had been unable to practice what they had learned in the workshop. Many of the teachers laughed about this particular workshop because they were learning a program that few could use. One of the high schools had only two monitors on its campus with the equipment to connect to a computer for Power Point presentations. One remained in the technology department and was used periodically for presentations at faculty meetings while the rest of the school shared the other. The other high school in that district had more monitors available, but the technology department lacked a vital piece of equipment, called an Aver-Key, that actually connects the monitor to the computer, allowing the computer screen to be viewed on the monitor by the class.

> I think it's really more a lack of application. At the beginning of the year in one of our in-services, they herded us all into the district computing labs to teach us how to clip art something from the Internet. Then they teach you how to do Power Point and insert the clip art and the text box. Fine. What am I supposed to do with that? I have no Aver-Key so I can't instruct the students on how to do that in my classroom. It's a little double-edged sword there where the administration gets to say "yes, our teachers have had training on Power Point programs and how to use the Internet in the classroom." So then the evaluators are looking for how you use technology in your classroom and they are expecting you to integrate it because, after all, you've had training in it! Well fine, but how am I supposed to integrate that in classroom work when I haven't been given the technical support for hooking that up in my classroom?

While teachers in the Trained Non-users group felt that the technology departments in the schools were doing the best they could with the resources available to them, they concluded that it is the school districts that are not committed to providing Internet access and instruction to either teachers or students. " . . . they [the school district] like documentation for everything, but unless they felt so strongly that they really trained every person adequately, it's just a document. Until they are willing to train people, it doesn't mean much."

> There were two [workshops] that I know of and I went, but unfortunately there were not enough computers to go around. So naturally the people who were computer literate rushed right in, got a computer, and you know, they're on. And you know the poor people like me who's [sic] afraid to punch a button, we're going "uh – duh" and [they told us] sit here and watch. And then at one workshop we had . . . the speaker was so technical that people like me . . .didn't understand what she was talking about. And then she's going to get up there with all this technical terminology, you know, and just rush through everything.

As these examples indicate, equipment and training were viewed as indicators of true intent on the part of the school districts. Teachers felt they were being asked to learn, to integrate, and to teach Internet technology while the district that employed them did not provide consistent full-time support for such activities. Those who are initially willing to learn or have limited training may become frustrated with the barriers of district policy and distribution of resources.

The ways in which Trained Non-users viewed their students' capabilities is a parameter that separates them from other groups while also justifying their lack of participation with Internet technology. Several of the teachers in sample schools with a high percent of "free lunch" students felt that Internet technology was a waste of time since many of those students are unlikely to own computer equipment and will "probably not go to college anyway." Concurrently, teachers in this group felt that these students lacked the motivation to search for access elsewhere in the building or outside school. However, none of the Trained Non-users

polled their classes for computer or Internet access and, when pressed for clarification, focused

on either the students' lack of proper discipline concerning equipment or lack of critical thinking

skills necessary for Internet searching. One group member stated that students have vandalized

equipment by removing the balls from the mice and "shoving all kinds of things into the floppy-

disk drives." In an excerpt from the interview another member explained:

> I don't want them touching my computer because they'll mess it up and no telling what
> they'll get into. Every time they get on it I have a hard time getting back in. They do
> stuff to it and I don't know how to get back onto the system and then it just causes
> problems, so I don't mess with that.

> *Do you take them to the computer lab?*

> No, I don't go to the computer lab. I'm old-fashioned, I believe they need to use their
> brain and do their own thinking, and these kids right now are so basic. [They are in]
> tenth grade and they're like on about a fifth grade level. I'm serious. And right now, you
> know, I don't think it would be to their benefit to be on the computer, because they don't
> have any basics. I mean you've got to have some basic knowledge before you can get on
> that computer and know what you're doing. I mean this is like taking a dog and sitting
> him up there in front of the computer and say "go to it." He wouldn't know what to do
> and that's the same way with these kids. It's so frustrating. They don't know anything! I
> think these kids have been brought up where they are just mesmerized by TV, by
> computer games, and they're just locked into all that where they're not having to do their
> own thinking. It's not left up to them to use their imagination.

> *So how do you feel about the Internet as an instructional tool in the classroom?*

> I think it's very valuable.

> *How do you think it's valuable?*

> Because of the wealth of information that is there. You can find anything that you want
> to supplement whatever it is that you are doing, but there's also so many more areas.
> When you send a child or a student to the Internet, they're not—well, of course I can't
> say that just—all inclusively. Of course, some of them are going to go to get the
> information that they need, but for the most part, *our* kids are not concerned with the
> educational purposes of the computer. They're concerned with the entertainment part.
> But no, I think it's very valuable and for me, if I had a computer at home, oh my
> goodness I'd probably never get off of it, just for pulling out all the educational
> information—things I want to know about. Things are always coming up that I want to
> be able to get to the library and then I stop and think "if I had a computer I could just
> have it right there", so I really do wish that I had that.

As a matter of fact, this teacher did have a desktop computer with Internet access in the classroom and both the computer and the access were operational. However, for this teacher the Internet in the classroom did not work. Nor did it work for the other members of the Trained Non-users group.

Teachers who did not use the Internet in the classroom also failed to use computing lab facilities for Internet-related student work. The few teachers who indicated they scheduled time in the labs did so for word processing of student research papers. While they allowed Internet sources for the papers, the number was limited to two, and the sources were not verified by the teachers. Generally, the members of this group did not assign homework or projects that are based on Internet technology.

The Trained Non-users appear to have a wide variety of problems with using Internet technology with very few solutions. What seems to perpetuate this condition is the reinforcement of the same type of in-service training sessions year after year and the resulting motivational apathy for district/teacher involvement that inevitably follows. The examples that have been presented illustrate how the social construction of technology can institute barriers to Internet use. Put another way, when we consider that Internet technology is socially constructed by teachers, individual perceptions may present the obstacles to classroom use that elude the scope of current training programs. Bringing these issues to the forefront may well be the first step in providing a type of training for teachers that focuses on what they consider to be insurmountable obstacles. In other words, providing sensitized instruction may offer teachers the solutions or the means they require to move beyond personal attributes and into the public school technology curriculum.

For both the Refusers and the Trained Non-users, Internet access in the classroom makes little difference. According to the SCOT, the Internet does not work. While the Trained Non-users presented problems with few solutions, the remaining group, the Users, have matched solutions to problems in such a way that allows them to take advantage of their Internet access and use technology for lesson preparation or class presentation. The following describes how this group of teachers feels about Internet technology in the classroom, the innovation they have shown in overcoming obstacles, and what they feel is necessary for them to maintain their grasp on Internet technology in the future within the context of the public high school classroom.

4. 1.3 Users

The Users group is comprised of teachers reporting years of teaching experience between three and thirty five and Internet experience from beginner to expert. No first or second year teachers were present in this group. Their descriptions of the Internet exhibit a toned-down quality when compared to those of the Trained Non-users; "[The Internet is] about like having a bookshelf", ." . . just an information source . . . a way to enhance lesson plans . . . more reliable than our library; it's pretty outdated", "I think it's a wonderful research tool", ". . . an important tool", "I look on it as just another tool", "It's just one more medium   . . . it's an instant library." Additionally, when asked how many teachers used the Internet in their opinion, approximately two thirds responded that "some" used it while the remaining group members said that "most" used it. All the teachers in the User group who felt that "most" used the Internet indicated that their level of computer/Internet experience was that of expert.   As a basis of comparison, the Trained Non-users overwhelmingly indicated that "most" or "all" teachers used the Internet. Taken together, the descriptions of the Internet and the perceptions of how many teachers used the Internet revealed a curvilinear pattern wherein non-users believed they are a

minority and the Internet is extremely useful, more frequent users were less impressed with what the Internet offers and more conservative in their perceptions of overall teacher use, while the few expert users were less impressed and feel that "most" teachers use the Internet. This finding lends substance to the earlier reports by Trained Non-users in reference to training sessions that are geared toward teachers with higher levels of comfort with both computers and the Internet. Since many in-service training sessions are conducted by peer instructors who have had the benefit of extensive computer and Internet experience, the fact that they perceive "most" teachers to be using the Internet may cause them to assume a level of technical expertise among their colleagues that is higher than it actually is. The implications for effective training classes will be further addressed in the next chapter.

All but two of the Internet Users felt that the school district was responsible for their computer and Internet training. This finding is unexpected, but potentially one of the most significant for school districts to understand. Out of forty-six teachers interviewed for this project, only two felt it was their personal responsibility to learn computer and Internet technology. The majority of this group felt unsupported by their school district in their efforts to adopt computer and Internet technology. They considered equipment, supplies, and on-site technology staff to be indicators of the districts' support.

> I think that they started off well in giving us the equipment, but I don't think they followed up. For example, we had to buy our own [computer]desks. That had to come out of our own money. So here's your computer, here's your printer and here's one ink [cartridge], but what are you going to do with it – where are you going to put it?

> I don't think we are supported. Truly, we need more time and an actual space to put these computers – a work station. In theory it all sounds real nice, but in reality, for most of us, it's not possible. But all that takes money.

> The district talks big on technology that's not really there. All but two rooms have only one teacher computer. Those two rooms have everything. Those are the ones they show on the news. The district is supposed to be big on computer technology, but we don't

have a computer lab and the librarians are worried about kids messing with the computers. It's almost too much hassle.

Approximately half of the Users group countered the problem of inadequate equipment by supplying their own. Most common are printers and cable connectors, including USB hubs, although several teachers reported bringing their own computers from home in order to set up specific student work stations. In some instances, teachers purchased their own computer desks to house the equipment given them by the district. At least two thirds of these teachers indicated that they supplement the school's equipment because it is necessary if they are to use technology in the classroom.

Inadequate classroom budgets present a problem in this transitory time that forces many English teachers to choose between traditional supplies like novels and workbooks and technical supplies like paper and ink. Budgets are usually between $75.00 and $100.00 per school year. In response to this challenge, innovative members of this group have charged students $2.00 per school year to cover the cost of ink and paper. However, this practice is not adopted by all teachers in each department, nor was it adopted across the board among the Users. Some teachers felt that students were already being asked to pay for more than they could afford while others felt they did not have the authority to implement this charge. One of the two school districts has since initiated a policy provision that allows teachers to collect reasonable fees for supplies. Interestingly, this $2.00 fee was charged by four out of six teachers from the same school prior to the policy change and this particular school has the second highest minority percentage in the district. In terms of the SCOT perspective, the theoretical concepts of closure and stabilization may be at work here. Within the department, teachers discussed ideas or solutions and came to a consensus. As time passes, other members of the department are likely to be exposed to this practice and adopt it themselves. In much the same fashion, universities are

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now charging technology fees for student access to computers whereas ten years ago it was virtually unheard of.

Among the Users are those who teach gifted, advanced placement, and honors classes. All teachers of these students are in this group. Every classroom for this type of student has more equipment and a larger budget than the regular English student classroom. When teachers of gifted classes were asked how many of their students had computers with Internet access at home, the reply was 99%. This percentage included the schools with the highest minority attendance and free or reduced lunch classification. All gifted classes are assigned homework that requires Internet use and regularly includes the use of email to receive or turn in assignments. However, the number of students in each gifted class is below ten. Teachers of honors and advanced placement classes indicated that in addition to research papers, the Internet is used to find and download scholarship applications and college admission packages beginning in the junior year. In comparison, teachers of regular English classes were divided as to whether they should assign homework that requires the Internet. While some felt it is the student's responsibility to find Internet access, others reported that if all students do not have home computers it would not be fair to assign the work. This will be further discussed in the next section.

Teachers of gifted or honors classes also indicated that they will ask students for help with both computer programs and repairs of equipment. "I haven't had any courses – I use it for email, research, and typing. I don't worry about learning the programs – if I don't know how to do something, I will ask students and they will help. I teach gifted students so I've gotten over them being smarter than me."

Approximately half of the Users were willing to ask students for help with all aspects of Internet/computer problems they run across including set-up, installation of programs, and troubleshooting. In some cases teachers offered extra credit for technical help and reported that both students and teachers benefit. "It gives them [students] a chance to shine. They need that. Once you relate to them they're more likely to ask you for help." It is also more convenient to have students help with problems since teachers report frustration with the current repair procedures.

> One of my (two) computers is broken. I have to take it to the tech center, but there's so much paperwork – so much red tape involved. The tech center staff has such a superior attitude. I will ask a kid to fix it before taking it to the tech center.

> The librarian is our tech support. When I asked a question before, the response was to fill out the paperwork, so I don't use her. Usually my questions are problem solving, troubleshooting kind of things, but I really need to know right then, not two days from now.

Filling out paperwork that describes the problem is technical, time demanding, and often exceeds their level of understanding. One district technology center required teachers to deliver and pick up their computers themselves, while the other placed teachers on a waiting list for pick-up and repairs.

> I don't feel like driving to the tech center after school – I'm tired. My computer has been gone for a week now. I had to take it during my planning period which is something I don't think I should have to do because I needed to be here planning for the rest of the week or getting school-related things done. I had to write up the problem when I got there and they said they would go ahead and fix it this time, but next time I had to follow protocol which is getting in touch with the librarian and filling out her report.

> I have two computers. I have a Mac G-4 and a Compaq. Both are down and we don't have a Mac person in the building. So I'm waiting, I guess, for a miracle to happen. I don't have a manual for the G-4 and it keeps saying Error 10, Error 10, so I've got to find somebody who knows what Error 10 is.

> When asked for suggestions for future training, several members of the group indicated

that they could learn more about their particular computer if they were issued the Computer Use

Manual that comes with the machine from the manufacturer. One teacher talks about her experience:

> My supervisor told me my new laptop was in and the tech center was installing the software. I had to return it the next day because the floppy disk drive would not take a disk. I received no manuals to tell me what features the computer had or directions to hook up a scanner or printer. I did not get any of the software or a restore disk in case I needed to reinstall a program.

Examples like this are common among the Internet Users. Teachers complained that they are issued equipment only, with no recourse but to contact the technology center when they run into trouble. Several group members said they wanted to know how to connect peripheral devices[2] to their computers so they would not have to depend on technology staff. Another suggestion was to encourage schools to use the same brand of computer with similar software so that teachers could share their work with each other and discuss common software or hardware problems. These suggestions seem to indicate teachers' willingness to take on more of the responsibility for maintaining their computers. They also suggest that teachers want solutions within the physical proximity of the classroom

Most of the Internet Users had learned to use the computer and the Internet on their own. What they wanted from training sessions were lesson plans for using Internet technology. Specifically, they wanted lesson plans that were applicable for high school class sizes of thirty students who share four or fewer computers and ideally, one computer. They did not want, nor would they use district web sites that offer suggestions for activities. "I'm aware that it's [district website] there, but we have new books we got last year that have all the lesson plans. Why am I going to dig around on the Internet for lesson plans when I have them at my fingertips in my book"? None of the teachers interviewed had visited the district technology website in the

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[2]Common peripheral devices are printers, digital cameras, mice, keyboards, and scanners.

four years it has been in existence. Therefore, according to the SCOT approach, the website does not work. What will work, teachers said, are hard, paper copies preferably in a binder or booklet. Easily accessed and convenient to browse at any time, paper copies allow teachers to plan lessons without the physical limitations of computer proximity. Since time is a factor that influences every aspect of being a teacher, they gravitate toward timesaving methods that fit into their busy lives. If implementing technology is not time-effective, teachers will simply continue doing what they have in the past because that does work.

The following and final chapter is a discussion on how these findings, organized under the social construction of technology framework, enhance previous research. When viewed with the SCOT perspective, Internet use in the classroom presents quite a different picture. Most obvious is the contingency factor – that actual use was conditional upon the perceptions of teachers and that these perceptions were influenced in ways that have not been captured by survey methods. Rather, they are unique to what Bijker calls "technical frames." These frames signify the teachers' context including the particular students, school technology staff, school district, state, and distribution of resources allotted to each. While the findings have been presented according to the theoretical concept of relevant social groups, the discussion below is organized to address the topics as they appear in the review of previous research.

CHAPTER 5.   DISCUSSION

5.1 Predictors of Teachers' Internet Use: Connectivity, Computer Expertise, and Constructivist Pedagogy.

In 1999, Becker predicted that, considering the degree of student research assigned and the level of classroom connectivity reported by teachers in a national survey[1], as more classrooms are connected to the Internet, more teachers will assign student research as well as use the Internet more frequently for classroom preparation. What he did not predict were the factors that teachers encounter in the context of their workplace that have convinced some of them to discontinue Internet use and others to wade through the challenges of using a resource that demands extensive mechanical, technical, and financial support. Using the SCOT perspective as a guide to investigate actual Internet use in public high school classrooms has revealed that access alone is not a sufficient predictor of Internet use. Though 87% of the sample reported Internet access in the classroom, more than half did not use the Internet for student activities. Coupled with computer expertise and constructivist pedagogy, the power of prediction still falls short.

Existing survey statistics, like those produced from the Fast Response Survey System (FRSS) for the National Center for Education Statistics, are only able to offer a static view of Internet use without taking into account the ever-changing, sometimes negative influences that teachers face within the context of their workplace. Whether they are real or imagined, true or false, politically motivated or socially determined, these influences make up the dynamics that will determine, day in and day out, whether Internet use in the classroom is feasible for a particular teacher. If we assume that increasing Internet access in schools is indicative of

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[1] Teachers highly valued Internet access in the classroom rather than seeking out access in another part of the building.

progress, we fail to address the human-user aspect of technology. Such failure implicitly leads to a belief that the Internet in the classroom works, in and of itself, simply because it is available. The findings presented in this study showed this to be erroneous. The fact that a significant number of teachers are Trained Non-users supports this. That these teachers had the equipment and training but no longer use the Internet in the classroom indicates that other factors are important.

During the interviews it became apparent that the Internet was rarely seen as being a separate resource from the computer itself. Granted, a computer is necessary before Internet access can be utilized, but a computer program is designed with a particular function like word processing, while the Internet is designed to retrieve and process information. The majority of teachers in the sample used the terms Internet and computer interchangeably and, often, incorrectly. According to the SCOT concepts of interpretative flexibility and closure, this indicates that teachers are still in the early stages of the transition to integrating Internet technology into classroom activities, whether their own activities or those of the students.[2] The lack of consensus as to what the Internet has to offer in the way of enhancing curriculum reflexively pits teachers against the employing school district whose responsibility is to provide adequate training for their employees, including, as teachers have reported, plans for implementation of Internet activities into daily curriculum.

Since the curriculum is the substance of the job, the employees look to the employer not only for the training to use the equipment, but for the lesson plans that outline the procedure and

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[2] "Many schools and teachers have not yet recognized—much less responded to—the new ways students communicate and access information over the Internet. Students report that there is a substantial disconnect between how they use the Internet for school and how they use the Internet during the school day and under teacher direction. For the most part, students' educational use of the Internet occurs outside of the school day, outside of the school building, outside the direction of their teachers." Pew Internet & American Life Project. 2000. *The Digital Disconnect: The Widening Gap Between Internet-savvy Students and Their Schools.*[on-line] www.pewinternet.org p.ii.

goals that satisfy the curriculum. After all, the methods they have used in the past to teach the

curriculum have worked well in their view. These traditional teaching methods do not serve

Internet activities well, however. Constructivist teaching methods, in which the teacher becomes

a facilitator for student-based critical thinking and problem solving exercises, are more

compatible with Internet exploration projects.

The majority of English teachers in the sample have received traditional method

instruction. However, with the exception of the Refusers and several Trained Non-users,

teachers feel they can facilitate Internet studies if they are given complete lesson plans. They

consider complete plans to include the lesson, ideas for topics, ways to choose student groups, a

list of websites, previously checked sources for quick reference, project/time outline, and grading

guidelines. The plans must also be structured for the class size and number of computers with

Internet access available within the class. The teachers gave the general impression that while

they may use the Internet for themselves, they do not necessarily feel comfortable enough to be

creative with Internet activities for the students, especially when the students exhibit a higher

degree of comfort with the Internet then they do.[3] Since so many of the teachers interviewed

mentioned the need for Internet lesson plans, it appears that they are willing to make the shift to

more constructivist methods if they have the support of the school district. Further discussion of

technical support and training will be presented later in this section.

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[3] A recent study of high school students offers this summary: "Internet-savvy students describe dozens of
different education-related uses of the Internet. Virtually all use the Internet to do research to help them write papers
or complete class work or homework assignments. Most students also correspond with other online classmates about
school projects and upcoming tests and quizzes. Most share tips about favorite Web sites and pass along information
about homework shortcuts and sites that are especially rich in content that fit their assignments. They also frequent
Web sites pointed out to them by teachers—some of which had even been set up specifically for a particular school
or class. They communicate with online teachers or tutors. They participate in online study groups. They even take
online classes and develop Web sites or online educational experiences for use by others" (Pew 2000:ii).

The comments made by teachers who use the Internet, about the Refusers and Trained Non-users, indicated that they felt the ability to be considered an effective teacher was not influenced by the use of Internet technology. Nor did the majority of teachers feel that students are being deprived of educational opportunities if their teacher does not include Internet activities in lesson plans. Many teachers felt that students were getting adequate exposure to the Internet through computer science classes. If they included Internet activities in English class, it would constitute enhancement of the lesson rather than supplying essential searching or referencing skills for students. The manner in which the Trained Non-users suggested this might seem justification for their lack of Internet implementation, but members of the User group also mentioned it -- which makes this topic one that might be addressed in training sessions.

On a broader scope, teachers need to be clear on the primary focus of computer and Internet equipment in their classroom. Is the desktop computer with Internet access a teacher's tool, a student's tool, or both? Of the two school districts in the study, teachers in one district were unsure as to the primary user, while over half of teachers in the other district reported *they* were designated by supervisors as the primary user. It is this latter district, however, that amended its policy to include allowing teachers to collect student fees for technology supplies like ink. Teachers still in the early years of computer/Internet technology may not be clear as to why they should ask students to help defray the cost of something that the students do not actually use in a hands-on capacity. The uncertainty caused by such actions could easily become a source of frustration that may lead to negative attitudes toward Internet use. The failure of school districts to specifically include teachers in the plans for technology implementation will likely perpetuate the uncertainty teachers feel, concurrently serving to set the district further

apart from the integral cog in the mechanism of delivering Internet technology to students.[4]

Another way in which these results differ from earlier survey research concerns the level of

expertise among teachers. An excerpt from the review of literature summarizes:

> Computer expertise held as the strongest indicator of valuation where teachers with more experience using computers are more apt to report that the Internet is essential to adequate teaching rather than simply representing a valuable tool for enhancing classroom instruction. Teachers who have prior positive experience with computers are most apt to visit the Web on a regular basis, transmit the value of the Internet as a research tool to students, and hold the belief that in order for their teaching techniques to be beneficial to students the Internet must be incorporated into daily classroom practices.

However, teachers in the User group have indicated they are less impressed with the Internet as a

research tool than those teachers in the Trained Non-user group. Descriptions of the Internet are

less excessive, more "toned down" with more frequent use of the Internet. Rather than implying

that the Internet is essential to adequate teaching, the descriptions take on a definite minimizing

quality: "just an information source", "just another tool", "just one more medium – it's an instant

library", "about like having a bookshelf."[5]

The explanation for the discrepancy between Becker's earlier study and the present study

may lie in the concepts of the SCOT framework and its focus on dynamic contributions rather

than static representations. Quite possibly, teachers with a higher level of computer expertise felt

that the Internet was essential to teaching when they were surveyed in 1999. However, in three

years time, would the distribution or maintenance of equipment within their district cause them

to change their views? Would they begin to doubt the feasibility of classroom Internet projects

when only one computer is available in a class of thirty students? Do negative indicators of

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[4] Teachers' satisfaction with being able to offer input and service in decision-making processes that involve new technology or curriculum has been linked to the level of enthusiasm they show for change and reform (Cuban 1986).
[5] This implies a concept of "the Internet as 'virtual textbook' and 'reference library'; Much like a school-issued textbook or a traditional library, students think of the Internet as the place to find primary and secondary source material for their reports, presentations, and projects. This is perhaps the most commonly used metaphor of the Internet for school—held by both students and many of their teachers alike (Pew 2000:ii).

technical support from the school district have the power to annul earlier intentions to use

Internet technology on a frequent basis? The elements of social construction posit that social,

scientific, political and economic influences interact dynamically within the context of an

artifact, in this case Internet use in the classroom. This study has found through teachers'

comments that the enthusiasm for incorporating the Internet to correspond with lessons has

diminished since the school districts first began distributing computers to the teachers in the

sample.

Becker examined teacher characteristics that would predict Internet use; finding, that age

is a factor, with younger teachers being more apt to use the Internet, that younger teachers have a

greater comfort with technology and that this level of comfort "outweighs advantages of greater

teaching experience" (1999:30). The findings in this study suggest that, among high school

English teachers, youth may be a predictor of Internet use, but is not an accurate predictor of

Internet use in the classroom. Fifteen teachers reported eight or fewer years of teaching

experience. While all said they felt comfortable using the Internet, only five used the Internet in

the classroom for student-based activities. A teacher in her first year of service, while using the

Internet at home, had yet to obtain a password to the school's network, suggesting that comfort

with technology does not extend to comfort within the teaching profession. Another, in his

fourth year, said he had not worked up Internet lessons thus far because he was working on his

teaching style. Similarly, four others with fewer years of service used the Internet themselves to

gather information or materials, but did not allow students access to the Internet or require

Internet research for assignments. Their reason for using the Internet was to acquire more

understanding of the material they would be teaching. While younger teachers may feel more

prepared to use the Internet (Rowland 2002), perhaps the feelings they report can also be

considered "the folly of youth." "Feeling ten feet tall and bulletproof" is an expression frequently used to describe the younger generation by adults who have gained wisdom and a sense of caution through experience. In any case, using the SCOT approach as a guide in research has turned up evidence that indicates even younger teachers are affected by socially constructed influences in spite of feelings of preparedness.

While younger teachers may report feeling well-prepared to use the Internet, as Rowland (2000) suggests, this study has found that more experienced teachers are not as apt to claim expertise even though their use of the Internet would indicate this might be so. One teacher with thirty-three years of experience who reported using the Internet between ten and fifteen hours per week indicated that she did not contribute material to teacher sites on the Internet because she "tends to think that what I have to say, everybody else knows." Another high-end user talked about the fragmentation of information on the Internet when gathering materials for class, adding the remark "maybe I haven't become a good enough searcher yet . . . maybe I don't know the right keywords or something." These statements are indicative of the overall perception gained from the more experienced teachers who used the Internet on a regular basis and incorporated aspects of the Internet into classroom activities. Within one district, twelve out of fifteen experienced educators indicated by self-depreciating laughter that they did not consider themselves as well-versed in the Internet as others. The impression I gained from this is that all were aware of the vastness of the Internet and modestly minimized or were unaware of the actual amount of knowledge they possessed, even though they were frequent users. This aspect of self-perception may come with maturity and experience. None of these twelve teachers showed or spoke of any lack of confidence in using the Internet, only that they were aware of the ever-

changing amount of information available. Their responses to how well-prepared they felt to use the Internet in the classroom reflected technology support rather than individual ability.

Two teachers proved to be exceptions to the underreporting of levels of expertise. Both individuals indicated a level of "expert" and said they had been so designated by the technology center in the district. A prime example of labeling theory, this finding is significant as we approach the subject of technology training for teachers. In both cases, the teachers were asked to participate in training programs provided by grants, whereby they would undergo intensive training involving all aspects of hardware and software, but no Internet instruction. The goal of the program was to provide on-site technical support for teachers through peer support networks. Other English teachers in the department reported that this arrangement has been instrumental in advancing their use of computers and the Internet since the inception of the program. During a break in interviews, a science teacher volunteered that her experience with the technology staff at the school was different than that of the English department. She had repeatedly asked at the office for someone to help her find out why she could not connect to the Internet. It seems a janitor had severed some cords to her computer and after fixing the cords the Internet connection did not work. She said she was very frustrated by having to wait and did not know the proper procedure for handling repairs. It appears that the English teachers benefited greatly from the physical proximity of technical support from department members, although this support may not extend beyond the department.

5.2 Technology Support and Training

Ninety eight percent of teachers in the sample felt that their employer, the school district, was responsible for providing the training they required in order to comply with district technology plans. This finding is significant as it directly contradicts the perception that it is

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one's personal responsibility to learn how to use new technology. We make jokes about finding a kid to teach an adult how to use a VCR, but it is a given that there is no entity "out there" that is responsible for our actual learning. If we want to record a movie, we learn how to use a VCR. In the teaching profession, the technology becomes part of the curriculum that is given to educators to pass on to students by their employers. They have not asked for a heavier load than they are already carrying, it has been given to them. The following account captures the social construction of technology (SCOT) in the high school teacher's workplace.

While interviewing teachers at one high school, it became apparent that the teachers were highly upset because the computer lab aide position had been removed due to budget cuts. Teachers could no longer send students to the lab during class time because there was no supervision unless they took the entire class. Since the students outnumbered the computers, especially those with Internet access, it created a problem to have so many students in the lab at one time. Most important, the technical help provided by the aide was gone. Not only did she supervise the students, she knew the quirks of each computer and printer intimately and could call out instructions to the student users to get them back on track. Teachers called her the "Goddess of the Lab" because she could do for the students what they could not do. Her position included no teaching duties, simply technical support and supervision. Beyond her duties, the aide also helped troubleshoot and repair teachers' computers, straightened out software problems, and, most of all, answered their questions immediately. With the aide gone, the door to the lab remained locked until a teacher signed up to use it. This lab was the only one available to teachers in the English department. None signed up to bring classes in to use the lab. When they were asked, individually, if a computer lab with Internet access was available to them, the answer was unanimously "No." It was obvious from the degree of emotion in responses that this

situation constituted an area of "disturbance" that required further investigation. Upon

contacting the coordinator of technology for the district, my inquiry, as to the reason all English

departments did not have labs, was met with laughter: "Who have you been talking to? No labs

have been shut down." She confirmed that the computer lab aide position had been cut the

previous year because of a budget shortfall and since it had been the last position filled, it would

be the first to go. This position was cut at all high schools in the district. She added that

teachers were not happy about losing their aides and may have decided to cease using the labs or

perhaps they were mad and simply told me the lab had been shut down. While she admitted that

not all labs had Internet access, and some had older machines, the labs were still functional in her

view. From the perspective of the technology coordinator, it is the teachers who are disgruntled

and refuse to make due with this inconvenience. She instructed me to contact the director of

high schools who would confirm what she had reported. He did confirm that the aide position

had been cut because of budget constraints and went on to say that the teachers were not

comfortable using the lab without a facilitator present and that he had noticed a "definite apathy"

among teachers after the aides were gone. When asked about the present direction of technology

implementation in the district, he replied that emphasis was on exploratory research using the

Internet which the district feels is "extraordinarily valuable."

The above narrative effectively demonstrates the extent to which teachers react to

negative indicators of support from their district employers. A teacher from this particular high

school summed it up:

> So that was a terrible thing that the district did . . . because they are stupid. They gave
> us all these computers and said you must use them and then they say, but there's nobody
> there to take care of them. That's ridiculous. The lab didn't get used. It's the idea that
> you must use this stuff, but we don't really care because we're taking away any support
> that we were going to give you.

In addition, teachers in districts that claim a high degree of commitment to technology through the local media offered stronger comments of perceived non-support by their district.

The findings confirm that teachers consider the presence and maintenance of equipment, as well as training to be indicators of the school district's true intention to support technology implementation. Citing the lack of practical equipment, failure to hire certified technology experts, grossly underestimating the number of technology personnel for each school, and overlooking the need to provide continuous, multi-level training, teachers feel unsupported in their efforts to adopt computer and Internet technology. These feelings were rarely directed toward on-site supervisors or school administrators, however. While several teachers indicated that supervisors were responsible for carrying out training procedures, 98% placed primary responsibility for their training on the school district.

Almost all teachers interviewed did not consider it appropriate to bother their on-site support staff with questions about implementing the Internet into classroom activities. In one school district the support staff is comprised of one full-time position, while any others were part-time positions held by teachers who also carried at least three-fourths of a normal teaching load. The other district had no full-time on-site staff. The full-time position is almost exclusively relegated to repair work on computers. Part-time technology staff usually troubleshoot hardware problems, install programs, and try to answer questions about software applications although they admit that part-time status prevents them from getting to all those who ask for help. The teachers that were interviewed indicated solidarity with their on-site technology staff and often, throughout the interviews, justified the lack of action to the constraints of understaffing and inadequate budgeting. Thus, it becomes somewhat

commonplace for teachers to operate under the assumption that their technology support staff is doing the best it can with the resources available to them.

When any part of the on-site technology department is made up by teachers, the results will be less effective than if outsiders are hired. Teachers relate to teachers. The common thread called time, connecting them all, actually works against those needing technical help. Interviews have shown that teachers sympathize with one another and will go without help rather than infringe upon one of their own. In the earlier narrative, teachers reported no hesitancy in asking the tech aide for help. Even after her position had been eliminated, the teachers from this school called her at home for help and reported she was still more than willing to work with them, often meeting in the classroom after hours. Several of these teachers indicated they would call her first for any problem they run into, rather than deal with the district technology center and its procedure. The decision, on the part of either the individual school administration or the school district, to use teachers for part-time technical support actually backfires on all concerned as it limits the position of technical support to the same constraints of time that teachers face, and if teachers will not infringe on the time of a perceived colleague, the arrangement will not work.

The final topic for discussion centers on the assignment of Internet homework; an area of dissent among teachers, that begs the question of whether the Internet in schools can be an equitable resource for all students. Few teachers of regular English classes reported assigning homework that would require Internet use. In general, teachers felt it is unfair to students who do not have home computers and Internet access. In many instances, teachers did not even poll the class to see what type of distribution exists. I have previously discussed teachers' perception of students' capabilities as a barrier to teacher's use of the Internet. I have only alluded to the larger issue of the digital divide, a term used to describe the unequal distribution of technical

resources based on socio-economic status. When teachers speak of fairness concerning Internet homework, the "red flag" goes up, signifying that teachers feel they are being asked to make a determination based on the tenets of equality for students in their charge. This determination is not necessarily theirs to make, as it puts them in harms way between irate parents and an employing school district over a matter that is controversial. When placed in the hands of the school district first, it becomes a matter of education and curriculum policy. The district has chosen to adopt and endorse constructivist teaching methods that focus on teaching students the skills of problem solving and critical thinking, including the age old problem of unequal access.[6] Backed up by a district policy that is founded on constructivist pedagogy, teachers can stimulate students to look to the Internet as a gateway to information outside the limits of physical location, and can guide students in capitalizing on access to resources. When used in this manner, the Internet becomes a realistic source for all students. What is unrealistic is waiting for all students to have home computers.

5.3 The Future of Professional Development

It is beginning to appear that the majority of teachers simply want to teach, while the school districts want them to take on secondary careers as technology professionals. Teachers have indicated that the way current technology support is handled by school districts places much of the responsibility for maintaining equipment outside the high school campus with little on-campus support for teachers' actual application of technology into curriculum.

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[6] In a survey of high school students, the Pew Internet & American Life Project summarizes a key finding: School administrators—and not teachers—set the tone for Internet use at school.
"The differences among the schools attended by our students were striking. Policy choices by those who run school systems and other factors have resulted in different schools having different levels of access to the Internet, different requirements for student technology literacy skills (e.g., some schools require students to take a course about basic computer and Internet skills, many do not have such a requirement), and different restrictions on student Internet access" (Pew 2002:ii).

This study has revealed some of the major influences affecting the implementation of Internet technology through the use of the SCOT perspective. Continued training, on-campus technology support, and properly functioning equipment including a classroom printer and ink are indicators of perceived support from school districts that interact to promote an atmosphere conducive to teachers' Internet use in the classroom. Key findings of this study are (1) 98% of teachers in the sample consider the school district responsible for their Internet and computer training, (2) using teacher-colleagues for support staff has a negative influence on a teacher's willingness to ask for help implementing technology into curriculum, (3) teachers who use the Internet more frequently report being less impressed with it as a classroom research tool than those who use it less frequently or not at all, and (4) existing survey statistics are inadequate to determine the true state of Internet use by public school teachers.

Few teachers are willing to pursue college courses in educational technology unless they do so as part of fulfilling requirements for a higher educational degree for which they have already planned. Citing low pay and lack of time, the majority of teachers feel they can get training that is specialized to their particular curriculum through the district, instead of broad-based technology training through college programs. They see the barrier to this as the district's sense of financial priorities. School districts might reduce land holdings and future acquisition of land for a period of time that would cover the transition to technology. Many teachers have questioned the funding for sports programs (including new stadiums) that are said to bring in revenues for the schools and the district, because the money does not apply to support salaries or the technology imperative. In any case, teachers generally do not have a sense of support in their efforts to adopt Internet technology, and view the budgetary priorities as indicators of true intent.

In the years since the inception of Internet technology in public schools, teachers who are enthusiastic about computer and Internet training have responded to school districts' offers of off-site training and take part in grant-based programs to promote the use of technology in schools. Thus, the first phase of promotion by attraction has been completed. The remaining teachers are not enthusiastic and look to the school district to provide them with the type of training they require in order to incorporate Internet technology into their area of curriculum. Presently, the only mandatory venue for training takes place during sporadic In-service programs that teachers have indicated are ill-equipped to handle the number of teachers attending, do not offer instruction for different levels of expertise, do not inform or address sensitive issues such as students' access, fail to correspond training topics to available equipment, and fall short of providing complete lesson plans.

Interviews with teachers have revealed that unless each school is addressed individually, In-service programs will continue to include training for equipment that does not yet exist and fail to address the specific needs of teachers. Among these specific needs are instruction on particular brands of computers including Macs and corresponding software, hands-on Internet search techniques within the subject that can also serve as instruction for students, hard copies of the information learned in training sessions for reference when practicing or teaching, strategies for organizing classroom technology lessons around one student computer, and sensitivity training in how to approach the issue of unequal access to computers among students.

Teachers have mentioned that peer training is effective if, and only if, the peer-instructor is speaking at a level of expertise that can be understood by those being trained. They have also indicated that informal sharing meetings among those in the same department have been quite useful in promoting ideas for instruction and providing the methods by which to carry out such

projects. Put together, small groups may benefit from instruction by peers who possess

knowledge of certain aspects of technology, but who are not necessarily expert in other areas of

the technology. The experts can be most useful in offering advanced training to peers who have

achieved higher degrees of Internet knowledge and seek project ideas[7] for class instruction.

Within the district, groups might be formed, first, based on grade level in order to address

practical Internet activities, and second, based on the level of computer expertise within the

group.

Paramount is the length of time spent in small group instruction. Teachers have indicated

that multiple-session, mini-workshops are not conducive to absorbing either the quantity or

quality of information they require. Full-day sessions where the first half of the day is devoted to

explanation and learning and the second half of the day is spent on practicing the concepts

learned earlier and completion of lesson plans, are more apt to leave teachers feeling they have

learned something that can be directly applied in the classroom. In sociological terms, the

training sessions need to be more robust and employ richer materials corresponding to teachers'

sense of technology support. In order to accomplish this, school administrators must begin to

allow adequate preparation time for teacher-presenters. Hiring a substitute teacher for the day

would provide both the time for preparation and the perception of district support required if

teachers are to take In-service sessions seriously. These training sessions are the venue for

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[7]A study of students' Internet use in the classroom states, "While students relate examples of both engaging
and poor instructional uses of the Internet assigned by their teachers, students say that the not-so-
engaging uses are the more typical of their assignments. Students repeatedly told us that the quality of
their Internet-based assignments was poor and uninspiring. They want to be assigned more—and more
engaging—Internet activities that are relevant to their lives. Indeed, many students assert that this
would significantly improve their attitude toward school and learning" (Pew Internet and American Life
Project 2002).

teaching the methods of constructivist pedagogy that are a necessary component of using Internet technology for classroom activities.

In lieu of In-service sessions, individual schools can promote Internet use among teachers through the use of daily e-mail, a practice currently underutilized. Teachers have indicated that e-mail is both the most used and the best introductory medium for the Internet. One teacher explained that the principal at another district e-mailed teachers every morning with reminders for the day, and again in the afternoon with issues that would normally be brought up later in faculty meetings that last anywhere from thirty to ninety minutes. Using Internet technology to save time is something teachers appreciate, while the implicit message becomes one of total school involvement in technology.

5.4 Conclusion

With Internet access in 98% of American schools it is only a matter of time before teachers are required to exhibit a minimum degree of computer and Internet proficiency in order for school districts to offer equal education across the nation. Undocumented newspaper sources have already reported a district in Dallas that will conduct competency tests among new teachers as a prerequisite for employment. Teachers already in the profession will be required to learn and demonstrate proficiency after a designated period of transition. The target schools of this study are under a seven-year implementation plan. What remains unknown are how the districts will deal with teachers who fail to demonstrate the proper knowledge and what recourse, if any, those teachers will have in holding onto their jobs. The findings generated by this study can be instrumental in revealing the areas of concern and developing the types of training that will be most effective for the differential needs of teachers. Opening the current discussion among administrators to include the social, scientific, political, and economic influences that appear to

affect integration of Internet technology, school districts will be better equipped to face the challenge of providing instruction, equipment, and continuing support for all high school teachers. A member of the Trained Non-user group sums up the general feeling among teachers, "Anything that's half done becomes a cumbersome stone around your neck if it's not implemented correctly, so it has to be done with a great deal of enthusiasm and full force and all things must come to bear if you're going to utilize it in the classroom."

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