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Teachers, Technology, and Change: English Teachers' Perspectives

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## Introduction

In the past decade, computer technology has not only changed the nature of resources, communication and information (Leu, Mallette, & Karchmer, 2001); it has also transformed contemporary society, changing the ways we live, work and learn (Hill, & Hannofin, 2001). As a response to such societal transformations, technology advocates have brought computer technology into classrooms, seeing it as a catalyst for change that will encourage information processing and problem solving, as well as student-centered learning and critical thinking (Getting America's Students Ready Report, 1996).

The positive goals envisioned for computer technology cannot, however, be realized by computers alone; computers are only a part of a complicated scenario of educational change. The key element in the change process is the teachers because, as Fulkerth (1992) explains, "the most important component in a change process is not an innovation itself, but the beliefs and practices of the people who are affected by it" (p. 1). Teachers need also to be seen not only as objects of change, but also as change agents who can transform their interpretation of their practices through the use of technology (Bruce, 1997).

Little attention, however, has been given to teachers' beliefs about technology and their experiences with it in their practices (Becker, & Ravitz, 1999; Bruce, 1997; Dodson, 2000). Research reports have focused on the realization of the mandates for technology integration both in pre-service (Eldridge, 2001; Rizza, 2000) and in-service (Peha, 1995; Reinking, Labbo & McKenna, 1997; Clark, 2000) educational settings. More specifically, there has been a lot of research documenting changes on the institutional level within schools, reporting on computer access (Becker, 2000; Dillon & Gabbard, 1998; Pianfetti, 2001; Technology Counts Report, 2001), professional training support

(Kay, 1999; Vrasidas & McIssac, 2001), and successful or challenging attempts to use technology in practice (Kinzer & Risko, 1998; Strudler et al, 1999; Vannatta & Beyerbach, 2000; Hawley Orill, 2001).

In this study, teacher perspectives are brought into the discussion on technology integration in education. By exploring teacher perspectives and their origins as determined by their positions and responsibilities within the school and classroom culture, the study will contribute to developing an understanding of teacher perspectives. This understanding is significant in informing research and practice on how to synchronize educational change with teachers' real perceptions, their actual capacities, and needs or desire for change.

#### Review of Relevant Literature

##### Research on Change and Teachers

There are several studies that attempt to explore the change process and teachers' role in it (Clark, 2000; Harris, 2001; Kay, 1999). For example, a qualitative study by Sarason (1971) explored the school culture in the process of implementing a new math program. Sarason held educators and administrators responsible for the program failure because they made too many assumptions about the teachers in the process of change and because they were unable to uncover the implicit teacher thinking about the change. Sarason also contended that educators and administrators failed to see the teacher role from a broader perspective--"a view of teachers as part of a matrix of existing relationships, practices, and ideas, within the larger 'culture' of schools, and school systems" (p. 229). Sarason noted that within such a system or culture teachers are often 'loners' (p.112) as they wrestle with problems and dilemmas, not receiving much support

from their administration. Teachers do not have a sense of agency either, for “they are not the part of a working group that discusses, plans, and helps make educational decisions” (p. 112).

In their introduction to a compendium on educational change, Fullan and Stiegelbauer (1991) stressed the importance of understanding educational change not only from the institutional and organizational points of view, but also from teachers’ perspectives. Fullan and Stiegelbauer argued that because legislators and administrators often misunderstand teachers’ perspectives on change, legislative and administrative policy fails to address teachers’ needs. Additionally, Fullan, and Stiegelbauer noted that classroom innovations do not necessarily agree with teachers’ assessment of their value and desirability. These innovations are often not transferable into daily realities of classrooms either, for legislators and administrators assume conditions that are different from those faced by teachers.

Recently, Toll (2001) described differences in perceptions among legislators, administrators, and teachers as “competing discourses of change” (p.318) and power. Toll explained that competing discourses not only reflect how change occurs, but also its underlying power structure, revealing, “Who is in and who is out, who is in the know and who isn’t” (p. 322). Toll also argued that according to legislators’ discourse “change is rooted in the belief of objective knowledge existing outside the local context and beyond individual teacher awareness” (p.321). Based on this assumption, legislators in Toll’s study rejected teachers’ judgment that technology may not necessarily be the best option for all instructional practices, the position assumed by legislators. As a solution for competing discourses, Toll proposed that legislators and teachers develop “a

metadiscourse” (p. 324) that not only recognizes these differences, but also brings them to the fore and creates dialogue within these differing discourses.

In yet another critical review, this time of Norway’s educational system, Popkiewicz (2000) saw the origin of the problems in the implementation of change among teachers in the structure of the system itself. Within that system, Popkiewicz observed that teachers were governed in a top-down fashion that involved not only changes in practice but also in the “construction of the self” (p. 19). Popkiewicz argued that policy makers assumed that teachers would share the same beliefs and feel the same need for change in the classroom as they did. As a way of avoiding such broad generalizations, Popkiewicz called to give teachers voice about the ways they envision change and the ways they would like to redefine their roles and identities in the change process.

Thus, research on educational change has held legislators’ and administrators’ misunderstandings of teacher perspectives responsible for failure of educational reform. Some researchers have made an attempt to bring the teacher perspective into the discussion on educational change, often extending it to the analysis of the culture in schools, organizations and educational systems. These attempts, however, were limited in the degree of teachers’ contribution to the discussion, for they tended to focus more on the trends and patterns in the change process rather than on the insights from teachers as change agents.

#### Teachers’ Perspectives on Technology in the Classroom

Little is still understood about teachers’ perceptions of new technological

innovations as reported by teachers themselves. To date, only a few empirical studies have explored teacher perspectives on technology integration into classrooms (Becker, 1994; Honey & Moeller, 1990; Fisher & Dove, 1999; McKenzie, 1999). For example, Saye (1998), in a three-year survey and interview study of secondary school teachers' uses of technology, attributed teacher attitude toward technology to teachers' dispositional tolerance for uncertainty. Saye distinguished two types of teacher attitudes: those that "find uses for [technology] to reinforce, rather than challenge, their established patterns of classroom interactions," and those for whom educational technology is a stimulus to "explore and experiment with new approaches to expand the possibilities of schooling" (p.6).

Becker and Ravitz (1999), in the National Network Study (NNS) survey of elementary and secondary school teachers' Internet use, found that teachers adopting a more constructivist framework of pedagogy were more likely to embrace technology in their practice than teachers following a more traditional model of instruction. Ertmer, Addison, and Molly (1999), in their survey, interview, and observation study on primary school teachers' uses of technology at one elementary school, reported "first-order barriers (lack of equipment, time, and classroom help), and second-order barriers (lack of relevance, mismatch with classroom management style, lack of confidence)" (p.8) as major obstacles to technology integration for the teachers studied.

Cuban (2001), in a national survey on elementary and high school teachers' use of technology, found that teachers' occasional-to-serious use of computers in their classes had marginal or no impact on teacher routine practices. Cuban concluded, "most teachers had adapted an innovation to fit their customary practices, not to revolutionize them" (p.

97). Unfortunately, the practices that Cuban observed among teachers were predominantly teacher-centered, where teachers transmitted knowledge to students, and students were merely its receivers (Manzo & Manzo 1997).

More recently, Windschitl and Sahl (2002), in an ethnographic and interview study in a laptop computer school, explored three middle school teachers' use of technology in their classroom practices. Windschitl and Sahl found that teachers' decisions about the use of technology in their classrooms were influenced by "their beliefs about learners and their needs;" their images of 'what counted' as learning activities in specific subject matter areas" (p. 198); and/or the degree of control over learning environment they wished to place in students' or their own hands, depending on individual teacher's instructional philosophy.

In summary, previous research demonstrated that features such as tolerance of uncertainty, beliefs about teaching and learning, social contexts, and reliance on routine practices determined teachers' perceptions of and use of technology in their classrooms. Little is still known about the ways teachers themselves constructed these perceptions and the ways they experience technology in their daily practices. To address this gap, this study explored middle and high school English teachers' perspectives on technology integration in their classrooms. Two research questions guided this study:

1. What are teachers' attitudes towards technology?
2. How do teachers perceive technological change in their instructional practices?



## Research Design and Methodology

### Theoretical Framework

Symbolic interactionism (Blumer, 1969), as it is applied in this study, assumes that human experience is mediated by interpretation. Thus, it is assumed that teachers' experiences of technology in this study were influenced by their interpretations. These interpretations, however, are "social products that are formed in and through the defining activities of people as they interact" (Blumer, 1969, p.3). In this study, I was also interested in teachers' interpretations of the relationships that they were engaged in within their frames of reference (Bogdan & Biklen, 1992) in the classroom with technology and technology literate students.

### Methods

Since I was interested in studying teachers' perceptions, a qualitative research methodology provided an appropriate framework to examine teachers' (or insider) perspectives by "approaching [them] with a goal of understanding their point of view" (Bogdan & Biklen, 1992 p. 35) in their own environments. More specifically, I chose what Stake (1995) calls a "collective case study" design, which allowed me to study "a number of cases jointly in order to inquire into the phenomenon, population, or general condition" (p.237).

### Gaining Access to the Site and Participants

Initially, I contacted principals in four city and three urban high schools, and two city and two urban middle schools for permission to do research. I wanted to have a range of teacher population as well as school settings for my study. Unfortunately, principals of only one city high school and one urban middle high school accepted my research

application. Each principal identified a contact teacher in each setting. In a snowball sampling technique (Bogdan & Biklen, 1992), these teachers introduced me to other (3 middle and 2 high school) teachers that they knew were using computer technology in their classrooms. A middle school was located in a wealthy neighborhood, and a high school was an inner city high school, both schools were situated in a city on the east coast of the United States (See figure 1 & 2 for schools' profiles and their technology resources).

**Figure 1: School Profiles Based on NYSED Regents Card Report 2000**

Suburban Middle School	Inner City High School
800 students in grades 5 through 8	1, 143 students in grades 9 through 12
70 teachers	79 teachers
45 students (5.5%) eligible for Free Lunch	561 students (49.1%) eligible for Free Lunch
Total expenditure per pupil \$ 10, 422	Total Expenditure per pupil \$ 9, 767

**Figure 2: Technology Resources in Each School Setting**

Suburban Middle School	Inner City High School
2 computer labs with 24 iMacs and 20 G3s	18 PC machines and 20 iMacs in the library
All computers connected to the Internet.	PC machines connected to the Internet
Each classroom has one computer connected to the Internet.	Only a few classrooms with a couple of computers
Several digital cameras and scanners in the building	Each teacher (2) had a computer at home
Each teacher interviewed (5) had a computer at home	

Teachers' range of experience in teaching English varied from two to twenty years. There was diversity among teachers in terms of grade levels taught. The majority of teachers had an MA degree in English, and professional computer training. One teacher was still completing her MA degree and another teacher had additional instructional design training. In terms of age, teachers varied from mid-twenties to late-forties. Four teachers were males and three teachers were females. All teachers were European Americans (see Figure 3 for a summary of teacher profiles).

### Data Collection and Analysis

Within the collective case study, in-depth interviewing was selected for data collection. Interviews were conducted with an open-ended protocol and spontaneously generated probes. The interviews were conducted at the schools where teachers taught, and within the time schedule that was convenient for teachers.

Audiotaped interviews were transcribed and turned into field notes with extensive commentary. The field notes and transcribed interviews totaled 204 pages. I regarded this commentary as my first microanalysis to reflections about my data (Strauss & Corbin, 1998). I also wrote weekly memos to myself with observations and emerging questions for clarification. Following Straus and Corbin's (1998) suggestions, I inductively analyzed the data by reading and sorting through field notes to extract key themes. The themes were then developed into a coding system, which allowed me to relate the codes to my research questions.

**Figure 3: English Language Arts Teachers' Profile**

Teacher	Grade	Teaching Experience	Technology Training
* Diana	8th grade	12 years	Courses in Power Point, web page design and search
James	8th grade	2 years	Self taught beginner in Power Point and digital pictures
Isabel	7th and 8th grade	12 years	None
Kathy	10th grade	10 years	Professional computer training; design and programming
Jerry	7th grade	7 years	Self-taught; Microsoft Word, Power Point
Bob	12th grade	15 years	Courses in programming and design
Patrick	7th grade	20 years	Courses in Microsoft Word, Power Point, and Data Base

\*All names of informants are pseudonyms.

### Results

Teachers in this study described their attitudes toward technology through considerations of what they seemed to gain from it, what bothered them about their own or their students' applications, as well as what they would like to see done in their environments so that they could employ technology on a more regular basis.

### “I haven’t Seen Major Improvement”: Disadvantages of Computer Use

Whether they used a lot of technology or not much, teachers in this study tend to apply a critical lens when they reflected on their experiences with technology in their classrooms; some teachers were ready to question its usefulness for either their students’ progress or for their own advancement. As Diana admitted, “I had fun making the Power Point, but ...my teaching didn’t really differ. It was a matter of if I was using the overhead projector or if I was clicking on the mouse for the next Power Point slide.” Another teacher remarked, “I haven’t seen major improvement because [students] use the computer.” Most teachers in this study, however, did not question or reject technology altogether. Rather, they shared the multiple concerns that technology brought into their practice.

### “Students are All at Different Places”: Pedagogical Concerns

From a pedagogical stance, the teachers in this study talked about the difficulty of teaching mixed-ability classes with reference to computer skills. Diana explained how she solved this problem in her classroom:

Students are all at different places when they get to you. So you have to just kind of back peddle and start with, “Okay, how do we get on the Internet before you can even go to how do we talk about a web page?”

A few teachers noticed that some students, especially young children, had conceptual difficulties when learning to use computers. For instance, James, a middle school teacher, realized that many of his fifth and sixth grade students struggled with the

concepts of cutting something from one place, bringing it over to another place, and pasting it in a document.

Alternatively, some teachers were afraid that their students might lose the ability to express themselves, with acceptable language conventions. For example, Patrick observed that when his students were “involved in a lot of instant messaging and e-mailing,” ...the conventions of the language got shelved.” As a result, Patrick believed that his students had difficulty with formal writing, for they tended to use the conventions of the online discourse such “complete elimination of any capital letters, the use of slang, and lots of misspellings,” which are not acceptable in formal writing. Thus, Patrick stressed the importance of making students aware of the varying language conventions so that they could succeed in their school careers or on a job market, where such knowledge is typically taken for granted.

With reference to doing research, most teachers in this study felt that students needed to develop critical literacy skills. Specifically, they thought students needed to learn to sort out what is a good source of information and what isn't. Patrick, for instance, urged his students to “pay careful attention to where they are getting their information and scrutinize those little com., org., edu., gov. [abbreviations]” to ensure that they were accessing reliable sources of information.

Some teachers in this study thought that technology actually changed the English language by “contributing large numbers of words,” some of which, Patrick explained, “are slang terms and pieces of jargon that are becoming something in current usage.” Teachers believed that the concept of literacy also changed as new computer skills were being added to their students' existing scope of competencies. Jerry reflected on how his

language and, consequently, his students' literacy competencies expanded as a result of computer technology:

I used to say, "Single space, single sided" and kids would handwrite it, and that was it. Now, it is to the point where I have to give the actual definitions, "I want 12-point font." "I want Geneva." "I want double spaces." "I want left page justified." "I want it paginated in this type of header format."

Many teachers, however, admitted that they felt either unqualified or just not ready for teaching such competencies in their classrooms.

#### "You Have to Run Around the Room": Administrative Challenges

The administrative challenges that the teachers in this study reported focused on two areas. For some teachers, arrangement of the desks in computer labs contributed to management difficulty. These teachers realized that a fixed, line-by-line arrangement of students' seats limited their monitoring capacities of students' work. For example, James complained, "You have to run around the room and you have to see the problems people are having." He explained that it was not easy for him to "address those problems" efficiently before he had to "move on to the next person."

Additionally, teachers were frequently challenged by poor organization of computer access to labs on a school level, which resulted in conflicts and overbooking. Isabel, a middle school teacher, reported that "despite all of those fancy computers in this building now, I really don't see that technology as available to my students... because, to me, in this building form does not follow function." That is, Isabel could not reserve the computer lab for a month or three weeks, the time she would have needed it for her writing workshop.

For many other teachers the logistics of time and cost-effectiveness mattered when they made a decision whether to use technology or not in their classrooms. Alternatively, teachers mentioned bureaucratic problems, as well. An illustration of such a problem was Bob's story. He had a number of computers in boxes that had been sitting for three years in the attic and he could not use them for, as he explained, "No one school owned all those computers...[And] nobody [The City District administration] wanted to make a decision as to where the computers would go."

#### "They are Very Trusting of the Internet": Ethical Concerns

Many teachers in this study voiced ethical concerns about plagiarism. Specifically, teachers noticed that their students had a tendency to use reference materials without citing the sources. Teachers blamed the Web sites for setting bad examples. According to Bob, many teachers in his school were "careful about getting kids to cite their resources right away." These teachers also agreed that it was a slow process, demanding hard work and time, the latter of which they did not seem to have in abundance.

Along with their students, teachers admitted they also had to deal with ethical issues. Kathy illustrated eloquently the questions that teachers asked themselves whenever they accessed materials from the online sources: " 'Where do you get your materials from?' 'Do you have permission for them?' 'Do you need permission for them, and if you don't get permission for them, then where can you use them and where can't you?' " Thus, teachers had to consider copyright laws, which they found to be "a fluid and flexible, and always changing medium" in the world of instructional technology.



## “If this were the Perfect World...”: Environmental Barriers to Technology Use

Some teachers in this study saw the computer potential for instruction in their classrooms, but only under certain conditions. In other words, these teachers realized that there were many obstacles in their immediate environment that they felt needed to be removed before they could become active users of technology in their instructional practice. Jerry speculated about some of those conditions:

If this were the perfect world, where we had all the time, and we had all the money and all the facilities, and all of the kids that wanted to do it, I would see technology having a huge stranglehold on kids...

Among other necessary conditions for technology use in their classrooms, the teachers in this study mentioned the need for an ongoing training in computer skills. James, for instance, planned to learn Power Point presentation skills for his class, as many of his students were already familiar with the program.

Similarly, Diana felt the need for professional staff development and teacher training programs that would actually show her how to teach with computers: “I feel this year I’m in a much more skills-based program, and I’m not sure that there are computer programs to help me or computer options to help me teach some of those skills.” Diana also suggested that a better choice of software programs for various age and level groups would encourage more frequent computer use: “I have found that software basically is up to about age 10, and they have reading software and writing software, but they don’t have it as much for older kids.”

Still other teachers wished for better-equipped classrooms, with more computers in individual rooms. James complained, “Having just one or two or three computers in

the room is not helpful. It is just not helpful.” Alternatively, some teachers wanted laptops in their classrooms. Patrick, for instance, speculated about the possibility of having “a relatively simple laptop that would be affordable to everyone, [and] that could be used for everyone to do word processing because that would help [students] out throughout the curriculum.” He wished for more powerful machines “with a full Internet hookup that are networked to print in the school labs for such purposes as newsletter design or presentation projects.”

All teachers felt the need to have technical support staff responsible for maintenance of the machines in order to prevent students from experiencing negative feelings about computers. James explained, “I don’t want [students] to get too frustrated with [computers]. I’ll take the frustration and they don’t have to.” Teachers wanted to see political changes on a district level that would encourage them to develop computer literacy. Diana’s suggestion that a district should “set aside time for teachers to work” seemed to echo sentiments of all teachers in this study.

Like the teachers who would use technology under certain conditions, the teachers who were very enthusiastic about technology could not avoid the discussion about concerns, dilemmas and problems with technology and technology savvy students in their practice. These teachers’ concerns were not determined so much by the level of computer expertise or personal comfort, but rather more by practical considerations from experiences in their own contexts. These challenges did not, however, change these teachers’ positive attitude toward technology and its impact on instruction as well as their role in the classroom. With this frame of mind, these teachers, for example, viewed computer technology as a tool encouraging a learning atmosphere for themselves and for

their students. When Kathy said, “I’m the instructor, but I’m here to learn”, she illustrated teachers view of such learning “as a joint venture”, that they were willing to share with their students. Jerry, another middle school teacher, emphasized the interactive nature of that venture as well:

If I’m up on the computer and if I’m doing something in front of the room and I’ll go, [and ask] “How do I do this?” The kid will come up, and I’ll go, “You da man. You hop in and do it.”

They also believed that their own learning experiences of and with technology allowed them to provide more student-centered instruction by giving power to their students to become their teachers.

#### “ ‘We’ll use it when we need to use it’”: Resisting Administrators’ Push for Technology

Finally, teachers in this study resisted pressures from their administration to use technology. These teachers did not reject technology per se as much as the way administrators forced technology into their classrooms. Jerry called this resistance “ a bit of revolution” when he explained its origin: “Our tech specialists, in order to get us more into it, they really, really push[ed] the computer. ‘Do this on the computer.’ Do this on the computer.’ ‘Do this on the computer.’ ” The teachers in Jerry’s school, on the other hand, could not buy into this policy for two reasons. First, they felt that computer specialists and administrators failed to see their actual needs, which did not always require technology. As one teacher remarked, “the chalkboard is just as easy and sometimes more effective.” Second, by pushing their own agenda without consulting the teachers, the specialists undermined teachers’ judgment and competence with reference to curriculum issues. Jerry shared what other teachers believed, too: “ ‘We’ll use it when

we need to use it.’ ‘We use the computer for specific things, just like we use the overhead, or we choose to use the board, or choose to read a book.’ ”

In conclusion, the intersection of the different dilemmas and concerns that the teachers raised in this study, indicates that teachers look at technology and its role in instruction is that of a practitioner and of a realist who knows his/her own limitations as well as the constraints of their own contexts. The teachers also resisted pressure from the administration to use technology in their classrooms when they felt it was not as effective as other alternatives available to them.

### Discussion and Implications

As the findings indicate, teachers in this study do not perceive technology as a goal in the sense as it is advocated in the current research on innovation and educational change. For these teachers, at least at this moment, technology is more of a problem with multiple facets rather than a solution or an ultimate goal for their current practices. The intersection of dilemmas and concerns that the teachers raised in this study led them to assume such a position.

More specifically, the teachers in this study showed that they do not see technology as an ultimate goal in their current settings because of the organizational problems, pedagogical, and ethical dilemmas, as well as their personal struggles in relationships with the school administration. This vision is shared not only by the teachers who resisted technology because of their low knowledge and comfort level, but also by the teachers who welcomed technology for an opportunity to become its learners in their own practices. The latter teachers, however, saw technology as a problem not

because of discomfort or incompetence, but mostly because of organizational and pedagogical concerns that technology raised for them in their own experiences with it.

The existence of this difference in perceptions of technology and its role for instruction clearly indicates a conflict of interests between the legislators, represented in current research, and the teacher. The origins of such a difference in perceptions are complex. First, as indicated in an earlier literature review section, legislators' perceptions are different from those of teachers' as these assumptions are not necessarily derived from each other's worlds. That is, because teachers and legislators tend to hold differing arrays of responsibilities, as well as distinguishing perceptions of the best ways of fulfilling such responsibilities, they tend to view technology and its role for instruction differently. In this study teachers indicated that their main responsibility is to help students master the curriculum material, and that they viewed technology as a supplementary tool rather than a changing agent, as it was perceived by their school administrators. Thus, even though both teachers and administrators were interested in the same goal—a better student performance, their views on the role of technology in achieving this goal varied, as determined by their perceived responsibilities and positions held within the educational system.

Alternatively, along the lines of Toll's argument (2001) these differing perspectives or what she called “competing discourses” (p. 318) can be explained in terms of power and knowledge distribution. That is, the competing discourses do not reflect only the manner in which change is seen but they also reveal, “Who is in and who is out, who is in the know and who is not” (p.318). Evidently, teachers in this study were

not in power or in the know-how position, for the administrators who pressured to use technology in their practices outweighed their judgment.

Second, teachers' and administrators' perspectives on the innovation could be different for the perceived value of the change. Namely, teachers and legislators use different criteria in assessing technological change. Teachers in this study proved that this was the case when they turned out to be governed by what Doyle and Ponders (as cited by Fullan & Stiegelbauer, 1991, p. 128) described as "practicality ethic", as opposed to legislators' "rationale ethic" (Fullan & Stiegelbauer, 1991, p. 130). In other words, along the lines of Fullan and Stiegelbauers' argument, teachers in this study were willing to accept the change as long as they were convinced that it would allow them to see the gain for their students as well as for their own instructional practice. Administrators, on the other hand, were reported to push for technology for they appeared to perceive it as an ultimate or the most optimal goal in any educational context. Teachers in this study indicated that such reasoning is not always necessarily translatable into practice with the resources at their disposal. In fact, they proved that these assumptions were different from teachers' own perceptions. In other words, although the teachers in this study admitted that they did not resist technology per se, they agreed that they could not fully integrate it into their own practices because of the organizational, administrative, pedagogical or personal constraints.

Understanding of these complexities within and across each of these groups is crucial for the resolution of the teacher/legislator/administrator conflict. More specifically, the administration and research need to learn about teachers' perceptions as do teachers need to learn about the administrators' rationale for their decisions. In other

words, each of these parties should step out outside their roles in order to learn each other's perspectives and their origins as determined by their differing positions and responsibilities within the school and classroom culture (Fullan & Stiegelbauer, 1991). In this way, an understanding of teachers will generate ideas that are responsive to teachers' perceptions and to their actual needs, for those in any role who deal with teachers. By the same token, teachers' understanding of policy decisions and the rationale for their implementation will give them the ways of lobbying for their causes and needs with the legislation.

The two parties need to reach such understandings in order to enter a constructive discussion about the nature of change in instruction and teacher roles in the classroom as necessitated by technological transformations in the outside world and the subsequent changes in the dynamics of relationships between administration and teachers, teachers and their students. The discussion should take the form of a two-way communication, though, where, as Fullan (1993) stressed, the leadership must not only express to the teachers their vision; explaining their realities, but also exchange theirs for teachers' realities. Teachers and policy makers need to learn to talk to one another as they engage themselves in the construction of the "metadiscourse" (Toll, 2001) that recognizes and builds from these differences. As teachers in this study indicated, insights from their discourses are essential for the change process, for they exposed the dilemmas and problems that need to be dealt with when implementing the technological change in their immediate environments.

Finally, it needs to be acknowledged that some teachers may choose not to use or learn about technology for various reasons such as not wanting to change the strategies

that have usually worked for them and for their students, or just because of their concerns about the logistics of time, cost, and effectiveness in their own contexts. This choice needs to be respected and welcomed as an alternative approach to teaching and learning. It may also be likely that not all content areas, and, consequently, not all classes will equally benefit from technology and technology students' assistance. Teachers need to be allowed to use their own judgment and make decisions whether to integrate technology or not, and yet, feel not pressured to do so by the administration or the community at large.

In conclusion, an open communication on the legislators' and teachers' parts is necessary for the change with technology to become meaningful and manageable to teachers confronted by technological challenges unique to their specific educational settings. Lack of such communication is likely to lead to an educational failure, for it will not address the existing variance among teachers' needs toward technology and their perceptions of its applicability, or lack of it, in their individual practices and contexts.



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