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ABSTRACT

This paper examines the impact of the El Paso (Texas) Technology Innovation Challenge Grant masters program in instructional technology on the classroom practices of K-12 teachers. The program emphasizes the integration of technology into the curriculum and the use of technology to drive education reform, rather than simply focusing on technology skills. Current research is beginning to indicate that programs such as this may be successful in transforming traditional, teacher-centered classrooms to more constructivist, student-centered environments. Case study and exit survey results are the main data sources for this study. Early findings support early conclusions indicating that there is a transformational effect with cohort teachers, and change agents are graduating who are having an effect, not just locally, but on a state-wide level. Implications and areas of current and future research are discussed. (Author/AEF)

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Classroom Impacts of a Masters Program in Instructional Technology

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Abstract: This paper will examine the impact of a masters program in instructional technology on the classroom practices of teachers. This program emphasizes the integration of technology into the curriculum and the use of technology to drive education reform, rather than simply focusing on technology skills. Current research is beginning to indicate that programs such as this may be successful in transforming traditional, teacher-centered classrooms to more constructivist, student-centered environments. Case study and exit survey results are the main data sources for this study. Early findings support early conclusions that we are having a transformational effect with our cohort teachers, and are graduating change agents who are having an effect not just locally, but on a state-wide level. Implications and areas of current and future research are discussed.

Introduction

In the roughly twenty years that desktop computers have been placed in schools, billions of dollars have been spent in the purchase of hardware and software. Over the last ten years questions have been raised about the effectiveness and results of this investment. Research has been at best spotty in showing improvement in student performance as a result of computer use, regardless of the type of assessment used (Trotter 1998). Lack of staff development in technology for teachers has emerged as one of the favorite explanations for this perceived failure of computers to cause increased performance. As a result, preservice teacher education programs and inservice programs for practicing teachers have begun to focus on providing teachers more training in the use of computers. And while research has begun to look at the effectiveness of these programs, little or no research has yet looked at the impact of a masters program in instructional technology (IT) for practicing K–12 teachers on their classroom practices and computer use. This study is an attempt to determine this impact, if any, in particular in a program that emphasizes the integration of technology and curriculum reform, rather than focusing merely on specific technology skills. This paper will use exit survey and case study data in an early attempt to determine the impact of the El Paso Technology Innovation Challenge Grant on the masters program cohort teachers, their classrooms, and their schools.

The Technology Innovation Challenge Grant's Masters Program in IT

The Technology Innovation Challenge Grant (TICG) is a five year, $3.4 million federal grant focused on systemic education change. The grant was awarded in 1995 and is scheduled to run through the summer of 2000. Its main areas of focus are on providing Internet connectivity in fourteen partner schools, increasing parental involvement in their children's schools, and professional development in instructional technology for K–12 classroom teachers.

In addition to providing wiring infrastructure for the partner schools, the grant provided multimedia computer stations for each schools' parent center, including a scanner, digital camera, videocamera, large screen TV monitor, and VCR. Parent centers were also given laptop computers for parent check out. Parents volunteer a certain number of hours, take some technology training, and then have the opportunity to check out the computers for home use.

The masters program in instructional technology is designed to provide K–12 classroom teachers training in the effective and innovative use of modern multimedia and communications technologies in the classroom. The focus of this program is less on the learning of specific computer skills than it is on new methods of using these technologies to improve student learning. The two year program includes four

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technology classes, four general education classes, practica in mentoring and classroom action research, and two electives. Teachers enter the program in cohorts of 15–20, and generally take all their classes together.

In the technology classes, education in specific technology applications and methods is combined with broader readings and discussions on issues such as the critical use of technology in education, education reform, and current theories of teaching and learning. In addition, many of the other classes, including both practica and electives, are taught by faculty working for the grant. Thus the philosophical/theoretical outlook proposed by the grant permeates the program and even extends into the grant's other areas, in particular parental involvement. I am one of two teachers of the technology classes, and was brought into the grant in its third semester, in the fall of 1995, when one of the original instructors left just before the start of the semester.

Literature Review

Like the Challenge Grant program I'm involved in, and other projects discussed below, the Apple Classrooms Of Tomorrow (ACOT) professional development program emphasized issues of curriculum integration and pedagogy as much as the learning of specific hardware and software skills. Early findings were that teachers implemented more constructivist, interdisciplinary, student–centered projects in their classrooms. Modeling expected outcomes and teacher practices was an important factor in encouraging this transference (Apple Computer, Inc. 1995).

Of particular note for my study are some of the suggestions found in the ACOT report. For instance, two types of instruction were offered, four week summer institutes and one week in–school practica. Attendance at either the summer institute or both programs led to greater change in classroom practices, and suggests a model that combines intensive institutes, exposure to actual classroom practice, and time to plan and design new curricula throughout the school year. This is interesting from my perspective because it is in large measure what our program offers. A university–based program also helps address a need observed in the report for ongoing support not just in technology skills but in implementation efforts, regardless of the level of support available in the school. Thus a university–based program with the theoretical perspective of the ACOT inservice programs seems well placed to offer the most effective environment for encouraging long–term structural change in education from the classroom up.

Norton and Gonzales (1998) provide a research report that directly examines the relationship between the inservice instruction provided and changes in the classroom practices of the participants. Using a combination of quantitative and qualitative measures, Norton and Gonzales support and build on the themes introduced in the ACOT reports. General findings from the Norton and Gonzales report show both increased use of technology with students and a shift towards integrating computers with content learning. And while the quantitative instruments didn't look for a more student–centered, constructivist classroom, both instructors and participants indicated a greater awareness of these new techniques and theories of teaching and learning, an interest in applying them in the classroom, and a belief in the benefits of having these methods modeled. Almost all teachers reported using or adapting in their classrooms at least one of the projects created during their training.

Jeff Archer reports in *Education Week's* Technology Counts issue (Archer 1998) on Harold Wenglinksy's latest research, which draws a connection between math scores on the National Assessment of Education Progress (NAEP) and computer use. This research is an example of a new trend in the research which looks at types of technology use when attempting to observe learning differences related to technology. Wenglinsky found a positive connection between using computers for math and learning games (4th grade) and simulations and applications (8th grade) and math scores. This was opposed to using computers for drill and practice, which had a negative correlation to test scores for 8th graders and no effect in 4th grade. The report speculated that not enough fourth grade teachers were using simulations and application software in math for that to appear as significant factor at this grade level. Within the broad limitations discussed in the article, Wenglinksy's research is an early and ongoing attempt to determine a link between types of computer use and educational progress as measured by standardized test scores.

Archer's report on Wenglinsky's findings regarding teacher training are of obvious interest to this study. Archer found a positive correlation between teacher training in technology and test scores. This effect was greater in 8th grade, and any type of technology training made the difference. This very limited finding does lend some quantitative support to the importance of teacher development in technology. While this report did not examine types or amount of training for their effects, the author suggests the obvious assumption,

supported by some research, that more training leads to more innovative uses of technology along the lines that the report found most effective in improving test scores.

Programs that focus on a combination of curriculum and technology training in their programs tend to concentrate on creating student–centered, constructivist classrooms. These types of classrooms are supported by the innovative uses of instructional technology emphasized in these inservice programs. The Wenglinsky research also addresses the critical issue of types of computer use, and supports calls for more innovative uses of computers to improve student performance, as well as continued teacher preparation in technology. Based on this research, technology instruction that focuses on changing teaching practices first, and ways of using technology to support that transformation second, could help change the instructional paradigm more than a focus on hardware and software.

While there are themes emerging from the recent literature on new methods of instructional technology education, research is still lacking on the effect of a university–based masters program in instructional technology on the classroom practices of teachers. The masters program examined in this study incorporates the new inservice notions described above. Findings in line with these other studies would help establish a new model for providing inservice teachers effective guidance in the use of new computer and communications technologies to transform the practice of education.

Data

A major initial data source for evaluating the masters program impact is an exit survey given to participants in the TICG masters program at the end of their technology sequence. This anonymous, open–ended survey includes five questions e–mailed to the cohorts after their final technology course. The questions are:

1. The greatest impact on my teaching as a result of the Challenge Grant has been...
2. The least useful part of the Challenge project in enhancing the education for the children in my class is ...
3. The strongest evidence I have that highlights the effect of the Challenge project on my students is...
4. The following should have been added to the Challenge project in order to have helped me become a more effective teacher...
5. Please add any additional comments that you feel are relevant to your experience as a Challenge project participant.

Three cohorts have finished the program, and data is given for the 37 of 49 (76%) teachers who responded.

Six main strengths or outcomes from participation in the program were identified by survey respondents (Table 1). They were: teacher appreciation of the program; increased teacher confidence using technology; increased student confidence using technology; improved use of technology; depth of student learning; and mentoring. These themes, and additional comments by teachers on the surveys, again mirror many of the findings of the research discussed above.

Category/Topic	Number of Teachers Who Addressed This Topic	Percentage of Total Responses to This Topic	Percentage of Teachers Who Addressed This Topic
Teacher Appreciation of Program	23	19%	62%
Teacher Confidence	22	18%	59%
Student Confidence	21	18%	57%
Improved Use of Technology	21	18%	57%
Depth of Student Learning	16	14%	43%
Mentoring	15	13%	41%

Table 1: Positive Impacts of Program

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Teacher confidence is a common theme through the research. Without feeling confident using the technology, teachers will never use it in innovative ways. Teacher and student confidence accounted for over one third of all responses on program strengths, with both topics addressed by almost sixty percent of teachers. This topic was addressed much more by the first two cohorts than the third (Figure 1), indicating a possible trend towards people with greater skills entering the program, and thus needing less confidence building.

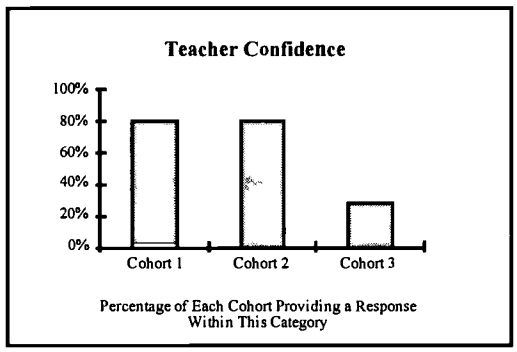

Figure 1: Increased Teacher Confidence

Improved use of technology is obviously something we would hope to find, and 57% of teachers addressed this topic. Some teachers mentioned better integration of technology into the curriculum while others spoke of a more transformational change from director of instruction to facilitator of learning. The first and third cohorts responded somewhat more to this category than cohort 2, possibly indicating the importance of the depth of the masters program in fostering change, as cohort two was endorsement only, and thus only took the technology classes. Responses regarding depth of student learning supports this conclusion (Figure 2). All three cohorts responded relatively equally regarding the importance of mentoring.

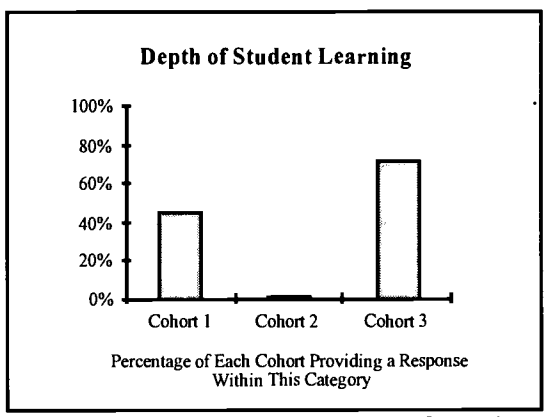

Figure 2: Increased Depth of Student Learning

While based on self–report data, these findings support those of other studies looking at the effect of inservice training on teacher practice. A combination of technology instruction, readings and discussions on education reform, and a focus on integration and innovation help teachers transform their teaching practice. Technology used for more than drill and practice can help this transformation to constructivist, student–centered classrooms. The following case study provides a look at the impact of the TICG masters program on one teacher, and tends to support some of the data discussed above.

Wendy Talbot

Wendy Talbot is a fourth grade teacher who completed the masters program with cohort 3. She is in her fourth year of teaching, all at the same school, and is participating in a looping experiment in the 3/4 and 5/6

grades. This means that her fourth grade students this year were her third grade students last year. I observed Wendy's classroom four times and followed this with an open ended interview. Informal conversations in and outside of school helped to clarify points, or lead to questions or areas of inquiry.

Wendy entered the masters program with many of the attributes we hope to see in our graduating teachers: a student–centered, constructivist philosophy and a good grasp of more than basic technology skills. She attributed her philosophy to outside readings and observations of other teachers, but specifically not to her observations as a student teacher or her preservice teacher education. Her constructivist bent was confirmed by classroom observations, within the limitations discussed below.

Confirming one of the possible trends found for more experienced computer users in the exit survey data, Wendy reported the greatest impact of the Challenge Grant program being

> the integration. To think about the existing curriculum. It's not like you have to change everything. But integrating stuff you already have ... and thinking how technology can make it even more effective. So my key word would be the integration part of it, the integration of the curriculum.

This puts Wendy in the improved use of technology theme in the exit survey data.

In addition to her view that the Challenge Grant helped her in integrating technology more effectively, Wendy also commented on the depth of student learning:

> When you do student learning type things, you students are working at higher levels, and there's more higher order thinking skills. When it's teacher driven, it's not the same thinking, it's not the same kind of achievement you get from the kids.

Observations of Wendy's classroom and interview data confirm that she struggles with a mix of innovative and test–related teaching. She even commented that the students know the difference when they're doing "fun stuff" versus test stuff. Wendy clearly prefers a student–centered, open–ended environment, with students in cooperative groups working on a variety of projects, and successfully creates this type of environment and large percentage of the time. While the masters program might not have affected her teaching practice due to it's already being in line with our goals, Wendy's responses on other issues confirm areas of impact in integration and deeper student learning supported by other Challenge Grant and research data.

Implications and Conclusions

Case study and exit survey findings from the El Paso Technology Innovation Challenge Grant master program begin to confirm other research on the effects of advanced technology instruction integrated with a focus on curriculum and reform. Since at least the 1995 ACOT report, a growing body of research indicates that advanced training in instructional technology should focus more on the creation of lessons and units that integrate technology in innovative ways into the curriculum. Outside readings that focus on reform and new teaching methods encourage change in teachers, both in their classroom practice and in their more activist roles in their profession. This is supported by my data, the exit survey data from the TICG masters program participants, and other research data (Apple Computer, Inc., 1995; Norton & Gonzales, 1998).

Participants in the TICG masters program, while still predominantly classroom teachers, are now found at all levels of the local and regional education system. Three are employed by the Regional Education Service Center, with a fourth employed at an Educational Service Center elsewhere in the state. Two cohort participants now work at the district level, while at least half a dozen are now technology coordinators in their schools. Many cohort participants at all levels, including Wendy, are involved in their school's parent centers, helping in technology training for parents. In all their positions, members of our program are training large number of teachers, students, and administrators. These educators are advocates for innovative, student–centered, constructivist, and critical uses of technology in the service of education reform, and are making an impact from the classroom on up. Through its focus on technology as an enabling tool for education reform, the Challenge Grant is helping to create a core of educators with new notions of the power and appropriate uses of instructional technology.

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Future Research

This paper describes a beginning of efforts to determine the classroom impact of the El Paso TICG masters program in instructional technology. We are collecting a variety of data focusing on classrooms, schools, and grade levels. In collaboration with other Challenge Grants we are developing a self–report instrument for teachers regarding their classroom environment. Additionally, we are collecting data on the state–mandated standardized test taken by all Texas students. Results of the Texas Assessment of Academic Skills (TAAS) are being examined on a school–wide and grade level basis. We will be comparing results from our partner schools against those of non–partner schools. Another aspect of this analysis will be comparing our low income partner schools (south of the interstate) with non–partner higher income schools in the same district (north of the interstate). Results from this data analysis will be available in the spring

Additionally, participants in the program are given a pre– and post–survey covering computer attitude, efficacy, and use, demographic factors, and beliefs regarding instructional technology. As might be expected, early indications are that teachers come into the program with high levels of belief in the power of technology to improve their teaching and student learning. Results are too preliminary to determine any significant changes in these attitudes, but again this information should start to become available in the spring.

I will continue to conduct case studies, documenting a wide range of teacher situations in grant participants. I will use TAAS scores within grade levels of the teachers I observe to look for specific trends within schools with cohort participants. This specific information should integrate well with the larger data being collected grant–wide to help in the discovery of more or more conclusive emergent themes regarding the classroom impact of the TICG masters program.

While early results of El Paso's Technology Innovation Challenge Grant have been encouraging, little hard data analysis, qualitative or quantitative, has been done. However, that has become our focus this academic year, and will continue to be so for the rest of the grant. The awarding a new $9.8 million professional development TICG to expand this program should also help in the longitudinal data collection. Early data support existing research that a program that emphasizes reform, integration, and technology can positively impact teachers and encourage the creation of constructivist, student–centered classrooms. Technology can be a compelling force supporting and encouraging this transition. Data we are currently collecting will help determine whether we are having this type of impact, and furthermore whether this type of training and teaching truly results in improved student achievement.

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