CHAPTER 1. INTRODUCTION

Each school day in America nearly 50 million students head off to approximately 97,000 public elementary and secondary schools, and before the school year is out, an estimated $489 billion will be spent related to their education (National Center for Education Statistics, 2007). A sense of urgency underpins the daily efforts of these education institutions. Because a student's education experience contributes to their opportunities for future successes, students deserve an education experience of high quality. For a school to be a launch pad to the levels of success sought by students, it must operate effectively.

Students in effective schools as opposed to ineffective schools demonstrate a higher level of achievement (Marzano, 2003). While several factors contribute to effective schools, leadership is considered vital to the successful functioning of many aspects of effective schools (Cotton, 2003; Leithwood, Louis, Anderson, & Wahlstrom, 2004; Waters, Marzano, & McNulty, 2003). A school's use of education technology is an example of an aspect of effective schools that can be impacted by leadership (Earle, 2002; Pitler, 2005).

Education technology has often been viewed as a class of technology that must be well matched to specific content areas and learning goals (Ringstaff & Kelley, 2002). Education leadership can help the organization stay focused on specific content area and learning goals. Resources (staff, equipment, facilities, etc.) must be in place before schools can begin the process of assimilating technology into their day-to-day instruction. Education technology leadership can help establish these required resources.

Once education technology resources are established, education technology leaders can use the technology as a source of learning tools. For example, technology has served as a strong catalyst for change at the classroom, school, and district level (Means & et al., 1993). Education technology has catalyzed changes in the content, methods, and overall quality of the teaching and learning process, triggering changes away from lecture driven instruction and toward constructivist, inquiry oriented classrooms (Culp, Honey, & Mandinach, 2005). Education technology tools have offered opportunity for change in the teaching process, making it more flexible, more engaging, and more challenging for students (CEO Forum, 1997, 1999; Office of Technology and Assessment, 1989, 1995). Education technology has been shown to have a strong impact when the technology integration into education is part of a broader-based reform effort (Sandholtz, Ringstaff, & Dwyer, 1997). The relationship between technology and reform is reciprocal. Each can benefit from the other.

There is evidence that in the last decade, pre-kindergarten through twelfth grade (P-12) schools have begun to accumulate sufficient resources to enable technology-supported change. For example, in the United States, the ratio of nine students per instructional computer in P-12 schools reported in 1997 (CEO Forum, 1997) has been reduced to 4.2 students per instructional computer in 2002 (Skinner, 2002). As the public desires and supports technology instruction in schools (Starkweather, 2002), many P-12 schools are increasingly promoting the use of technology (e.g., computers, software, and peripherals) in teaching and learning. Toward achieving that goal, professional development targeting the mastery of technology, such as opportunities to learn new computer programs or technological deices, is offered to teachers and staff in schools. In

addition, most schools/colleges/departments of education now offer educational technology courses within the teacher preparation program to prepare future teachers to be education technology literate (Office of Postsecondary Education, 2003).

If the measure of success, however, is usage of these technologies to facilitate student learning, American schools still have a long way to go (J. McKenzie, 1998). Many commentators have noted that the level of integration of technology into school environments remains despondently low (Cuban, Kirkpatrick, & Peck, 2001; Healy, 1998). Although nearly all public school teachers now have access to computers or the Internet somewhere in their schools, only one-third of them feel "well prepared" or "very well prepared" to integrate the use of computers and the Internet into their teaching (Rowand, 2000). This large-scale absence of effective technology integration, and the resultant lack of impact on student learning, rests squarely on the shoulders of the leaders charged with implementing and enabling effective schooling practices. If the "observable failure of schools to actually use their . . . computers to any meaningful extent" (J. McKenzie, 1998, p. 6) ever is to be remedied, school technology leaders must be "leaders of change, supporters of teacher development, and modelers of technology" (Yee, 1998).

While often focused on the leadership skills of the school administrators, the study of education technology leadership also considers sources of leadership from other education stakeholders, including teachers, technology coordinators, parents, students, and community members (Twomey et al., 2006). Effective school organizations benefit when they recognize, develop, and measure education technology leadership capacity across their organization.

Statement of Problem

Teacher professional development programs often have focused on developing skills related to teaching standards. Teacher education technology professional development programs often have focused on developing skills related to education technology standards, such as ISTE NETS-T standards (ISTE, 2002). These skills have helped educators integrate the use of technology and technology based tools into their teaching practices. This integration of education technology has offered opportunities for change in instructional practices in both the classroom and in the school. But knowledge of how to use technology effectively has been only part of the challenge of integrating technology into the curriculum. Consistent, meaningful, sustainable change requires vision and leadership.

Educational leadership preparation programs have been slow to recognize the unique leadership issues related to technology confronting their graduates (Dikkers, Hughes, & McLeod, 2005). The only current large-scale initiative in this area, the Bill and Melinda Gates Foundation State Challenge Grants for Leadership Development, is temporary and focuses on professional development of current practitioners rather than on leadership pipeline issues.

School education technology leadership often has been associated with the school administrator. There have been studies measuring the education technology leadership of school administrators (Ertmer et al., 2002; P. E. Holland, 2001; Hughes & Zachariah, 2001; Mirra, 2004; Wilsmore & Betz, 2000). But studies have also shown that schools can have education technology leadership capacity beyond the school administrator's leadership (Baylor & Ritchie, 2002; Dikkers et al., 2005; Granger, Morbey, Lotherington,

Owston, & Wideman, 2002; L. Holland & Moore-Steward, 2000; Spillane, Halverson, & Diamond, 2001; Welkowitz, Cohen, & Ewen, 2006). There has been limited research looking at the education technology leadership capacity of educators in addition to school administrators.

Eight standards for education technology leadership have been developed (Twomey et al., 2006). Leaders proficient in these standards would be expected to provide leadership based on a strong education technology vision, and would facilitate systemic, whole-school change that seamlessly includes technology as an important, rather than marginalized, element of the education process. Successful and effective technology integration requires systemic change that permeates the entire school organization and structure, including vision, finances, policies, and curricula (Dede, 2000). Schools have experienced difficulty connecting technology infrastructure with effective leadership in order for students, faculty, staff, and the community to reap benefits from technology. And despite the fact that technology leadership may be "the single most important factor affecting schools' successful integration of technology" (Byrom & Bingham, 2001), surprisingly little attention has focused on the technology-related leadership skills of educators. An instrument designed to help educators assess their education technology leadership would be useful.

Purpose

This study worked within the field of education technology leadership. The purpose of this study was to develop, validate, and field test a survey instrument based on the eight ISTE TL Standards (Twomey et al., 2006). The survey instrument was designed to assess the extent of the education technology leadership of any educator or education

stakeholder. The instrument was designed to be used as a web based, self-assessment survey tool (Rea & Parker, 2005).

For this study, existing technology leadership assessment tools were reviewed and potential survey items were collected. An expert judgment panel of existing education technology leaders was formed. The panel consisted of school technology coordinators with education technology leadership experience. The expert panel reviewed potential survey items and provided feedback to the researcher that allowed for the refinement and alignment of the items with the eight TL Standards. The researcher's goal was to have 4-6 valid items for each TL Standard. The completed survey had 38 items.

It was important to test the reliability and validity of the survey. A field test of the survey was conducted with a selected group of educators in the Des Moines Public School District, an urban district of 32,000 students located in Des Moines, Iowa. The information collected in the field test was used to statistically evaluate the reliability and validity of the survey. Underlying structures inherent in this data were also examined using exploratory factor analysis.

Significance of Proposed Study

Education technology leadership has been found to be an important element in the integration of technology with education. Education technology leadership standards have been developed. The development of an instrument designed to assess the extent to which an individual or group possess skills relative to these education technology leadership standards would be useful to those interested in the development and study of education technology leadership.

Research Question

Following are the research questions for this study:

(1) What are the set of items aligned with each of eight education technology leadership standards that would be part of a reliable and valid survey instrument that would assess the education technology leadership skills of an individual who completes the survey?

(2) What are the underlying structures of the data generated by these items?

(3) What are the inter-relationships between the underlying data structures and the education technology leadership standards?

Basic Assumptions

Technology has been used to refer to a broad class of tools and aids. Technology in a broad sense has been defined as the "application of modern communications and computing technologies to the creation, management, and use of knowledge" (Fitzpatrick & Pershing, 1996). For the purpose of this study, education technology referred to computer and communications technologies that are owned and operated by school employees or students.

Key assumptions of this study include:

1. The expert judgment panel members were experienced technology leaders who were knowledgeable of current and emerging practices for integrating technology into education.
2. The expert judgment panel members were able to distinguish between the eight TL Standards in a common and consistent way.

3. The practice of technology integration in education is sufficiently similar across all P-12 applications so that the alignment of survey items with education technology leadership standards will be similar independent of the membership of the expert judgment panel, as long as the membership consists of practicing education technologists.

Delimitations

The goal in developing the Educator Technology Leadership Assessment (ETLA) was to produce a short, multiple-choice assessment to assess the school technology leadership of an individual and/or group of individuals. The accuracy and usefulness of this assessment was largely dependent upon the candor and care of the participants. When assessing behaviors and performance, individuals have a tendency to make several types of errors (Grote, 1996):

1. Leniency error. This occurs when an individual gives an assessment higher than they deserve. This could occur for several reasons: the individual has relatively low performance standards; the individual assumes that other individuals also inflate their ratings; or, for social or political reasons, the individual judges that it would be better not to give a poor assessment.
2. Halo error. This occurs when an individual gives an assessment based on a general impression of their performance or behavior, and the general impression is allowed to unduly influence all the assessments given. An example of halo error would be an individual who rates highly on every single assessment item. It is rare that individuals perform at exactly the same level

on every dimension of leadership. It is more likely that an individual performs better in some areas than on others.

3. Recency error. This occurs when an individual bases an assessment on their most recent behavior, as opposed to their entire behavior over some fixed period of time (e.g., the last year). This assessment should be based on the participant's behavior over an entire year.

In addition to participant related data errors, other delimitations of the study were: (1) a limited number of professionals were invited to participate on the expert judgment panel and (2) the survey items were aligned with the TL Standards during a specific time frame.