DISSERTATION

INFORMATION TECHNOLOGY TEACHERS' PERCEPTION OF IMPLEMENTING THE NATIONAL EDUCATION TECHNOLOGY STANDARDS

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY LINDA B. WALTON-TODD ENTITLED INFORMATION TECHNOLOGY TEACHERS' PERCEPTION OF IMPLEMENTING THE NATIONAL EDUCATION TECHNOLOGY STANDARDS BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION

INFORMATION TECHNOLOGY TEACHERS' PERCEPTION OF IMPLEMENTING THE NATIONAL EDUCATION TECHNOLOGY STANDARDS

Business education teachers were given a new charge in the early 1900s—to teach new technology—as a result of which the business education teachers became the information technology teachers. The teachers were given optional training. Some accepted the new technology, while others were frightened of learning it and using the equipment. Then national technology skill standards were developed to insure that all teachers were integrating technology into their subject areas. The business teachers now were looked to for assistance in training other teachers about technology.

This non-experimental study addresses how many of the information technology teachers in the Chicago Public Schools system perceive they are addressing the national technology skill standards. The teachers were surveyed concerning their technology preparation, skills, experience, and general background in delivering the

National Education Technology Standards (NETS), National Standards for Business Education (NSBE), and Secretary's Commission on Achieving Necessary Skills (SCANS). The study found that few teachers were Microsoft Office Specialist (MOS) certified. Half of the respondents had taken a refresher technology course within the year. Sixty percent of them perceived they were prepared to implement national technology skill competencies. Out of the nine reporting areas, the teachers' strongest confidence for implementation was word processing; and the weakest was HTML and web page design. All but one of the gender variable comparisons was non-significant as it relates to preparation and skills in implementing technology competencies; females overall had more years of teaching. Most of the teachers were aware of the standards, but less than 30% of the teachers' had formal training, and 80% requested formal training. The teachers enumerated the staff development of HTML/Web Page Development, NETS, SCANS, and NSBE because they would enhance their delivery of national technology skill standards competencies.

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CHAPTER 1

INTRODUCTION

How do Information Technology (IT) teachers address national education technology skill standards? If information technology teachers are not aware of the educational technology competencies, how can they assist other core content teachers with integrating technology? IT teachers are the technology resource foundation of most high schools. Most IT teachers are using or implementing integration of content areas such as English, history, math, and social studies into their curricula. Wisniewski (1999) quoted former Chicago Public Schools Chief Education Officer Cozette Buckney: "Technology needs to be integrated into each of the subjects... A student might be able to learn a software package in two or three weeks, ...but it has to be for a purpose, I want to see technology used to raise student achievements" (p. 23). Newman (2000) stated:

> Even after several years of using Microsoft Word, I'm still learning how to do new stuff, and when the next upgrade becomes available, I'll have to learn the program all over again. We can't expect teachers to "teach" using these tools when they're not proficient and comfortable with them. It takes time - a lot more than a 15-week "tips" course - to achieve a level of

> comfort. Nor can we expect teachers to see the instructional potential of new tools if they haven't personally used them for learning something useful themselves. (p. 776)

Gordon (2003) states, "Business education has had to change curriculum and instructional practices continuously to keep pace with changes in business, equipment, organization, policy, and make demands. Instruction focuses on skill development with word processors, computers, high-speed copiers, laser printers, and fax machines" (p. 156). Assessment and professional development must be implemented to reap the full benefits of technology. Use of technology must be up to date, and training in technology is an ongoing process.

National, state, and local agencies have formulated skill standards to address students' and teachers' information technology (IT) development. Computer skills will be the most heavily required in the future. According to O'Reilly (1992), anyone who uses a computer is likely to earn 15 percent more than an equally skilled co-worker who does not. Valdez, McNabb, Foertsch, Anderson, Hawkes, and Raack (2000) stated, "Students and teachers with more than ten hours of training significantly outperformed those students whose teachers had five or fewer hours of training" (p. 26). Formal computer training and appropriate

usage advances students' and teachers' rewards and performances. Researchers Gonzenbach and Davis (1999), Martin and Lundstrom (1988), and the U.S. Department of Labor (1992) found that there is a need for students to possess information technology competence to enter into and succeed in the global marketplace.

Before today's students are able to efficiently and successfully enter today's workforce, they will have had to learn the information technology skill standards required by IT industry, national, state, and local entities. Gordon (2003) states, "technology invaded our vocational schools in the 1990s. . . . Vocational teachers were leading the technological invasion in the hope of preparing student for the computerized, information-based worked in which they would work" (p. 14). Kitagaki (1995) indicated that young people just beginning a career would be most concerned with learning technology at a faster pace to be proficient in their careers. Information technology presents many challenges to the students. McKenzie (1999), stated:

> "Using new tools to help students master the key concepts and skills embedded in the science, social studies, art and other curriculum standards. It is no so much about powerpointing, spreadsheeting or word processing. The focus should be on teaching and learning strategies that make a difference in daily practice - on activities translating into stronger student performance. (p. 1)

Within existing classrooms, teachers have to address these IT challenges of students learning technology at a faster pace. As well as learning to apply appropriate technology tools to solve problems.

The Office of Technology Assessment (1988) stressed that the use of technology cannot be fully effective unless teachers receive adequate training and support. Yet, who educates the educators to be sure they are knowledgeable and able to train the students? Chin and Horton (as cited in Kotrlik, Harrison, & Redmann, 2000) stated, "The teacher is the change agent between the learner and technology and plays a critical role in the process of teaching and learning" (p. 397). The following statement by Kotrlik et al. (2000) supports this quote:

> Therefore, it behooves the teacher to stay abreast of changing technology and current opportunities in order to assure his/her place of leadership in instructional technology. That in turn, is supported by the cry from business and industry for better-prepared individuals for the global workforce. (p. 397)

These knowledge and skill bases have become so important that four national organizations have developed standards or skills sets to address both the students' and teachers' needs to be successful in the information technology industry. The International Society for Technology in Education (ISTE) along with the Professional

Standards Committee initiated the National Educational Technology Standards (NETS). Preparation of these NETS standards was funded by the U.S. Department of Education to prepare tomorrow's students and teachers to use technology effectively and efficiently (ISTE, 2000). The second concerned national organization was the National Business Education Association (NBEA). The NBEA developed National Standards for Business Education (NSBE). The NSBE Information Technology academic areas are comprised of divisions, achievement standards, sections, and levels.

A third organization, the National Association of State Directors of Career and Technical Education Consortium (NASDCTEc), developed States' Career Clusters. These represent a grouping of vocations and skills that provide students and teachers with an overview of career clusters, job opportunities, and skills (Bureau of Career and Technical Education, 2004, p. 1). A fourth national organization is the U.S. Department of Labor Secretary's Commission on Achieving Necessary Skills (SCANS). This commission developed core foundations, competencies, and technology skills for students and teachers. Not only was the concept of IT training a critical issue for both students and teachers at the national level; state agencies

initiated improvement of IT skills development and delivery.

Illinois is an example of a state making such improvement. In Illinois, the skill standards are being addressed through three avenues: (a) six learning essentials for technology; (b) states five-year technology plan; and (c) the Illinois Occupational Skill standards (IOSS). In 1995, the Illinois State Board of Education (ISBE) adopted six learning essentials for technology (State of Illinois, 2000 p. 21). In 2001, the State of Illinois formulated a five-year technology plan for the years 2002-2007 called Digital-Age Learning that provides for students and teachers to address technology literacy, higher-order thinking, and "21st century skills" (p. 1). While the cluster technology plan did not give an interpretation of these 21st century skills, I believe them to be the current use of technology applications and equipment. The IOSS stated that information technology end user applications cluster skills are used to perform workplace tasks using the following applications: (a) word processing, (b) spreadsheet, (c) database, (d) presentation, (e) desktop information management, and (f) Internet/Intranet (Hefferin, 2003). In undertaking the state roles in implementing the national skill standards,

the Business and Administrative Service subcouncil and the Illinois Occupational Skill Standards and Credentialing Council (IOSSCC) incorporated "the latest advancements in technology and changes in employment trends" (NASDCTEc, 2003, p. ix) into the IT cluster booklet. The state has asserted that without these skills, the students of Illinois will not be fully prepared to live, learn, and work in a digital age.

The national skills and standards that were developed flowed to the state, which in turned flowed to the individual districts within the state. The State of Illinois addresses the entire state, while each individual school district develops various procedures to address required and recommended national and state skills and standards.

One such school district is the Chicago Public Schools (CPS) Career and Technical Education (CTE) division called the Department of Education to Careers (ETC), which translated the skill standards being passed down from the state into the respective syllabi that include a task listing. The ETC department provides 11 career clusters that include 50 programs. The 11 career clusters are agriculture and horticulture; architecture and construction; arts, A/V technology, and communication;

business and finance; health science; hospitality; human services childcare, cosmetology and barbering; information technology; law; public safety and security; manufacturing; and transportation. For the purpose of the present study the information technology cluster will be addressed. The IT cluster has three programs: business systems networking and telecommunication, computer programming, and information processing. This paper focuses on the information-processing program and its teachers, formerly known throughout the system as business education teachers.

Once the system began to phase out the courses such as business law, business English, data processing, and keyboarding, the business education teachers were required to teach information processing or change their subject concentration. Irvine and Montgomerie (2001) recognize that teachers are being required to deliver new curriculum without training. Therefore, Irvine and Montgomerie (2001) developed a study to evaluate teachers computer skills in order to develop appropriate professional development "to improve the match between the needed skills . . . and the curriculum being offered" (p. 2). Given that the teachers were not formally trained to make the transition. Most of these teachers were self-taught. Later, CPS did offer volunteer classes, but the State did not recognize them.

Therefore, most teachers who took the classes received the training but no endorsement from the state. The No Child Left Behind (NCLB) law and the agent ISBE that funds the CTE course offerings, request that the teachers must have an endorsement in the area they teach. For information processing the endorsement is just that. Not only does the ISBE require the teachers to have specific endorsement; it also requires them to have 2000 clock hours of work experience in the field of study. The State of Illinois has within the last three years requested that all teachers submit a re-certification plan and fulfill the plan within five years of reissuing the teacher's certification. Teaching technology is a challenge because of the ever-changing computer hardware and software. This may create implementation difficulties to those in the educational field who are trying to keep abreast of the latest technological tools and software that needs to be imparted to the students. A goal of this study is to provide an avenue to ease IT teachers' burden of acquiring IT training as well as provide certified training that the state will recognize. The Report of the National Assessment of Vocational Education (2004) stated:

> The federal government should invest in research to determine how young people best learn skills and acquire knowledge . . . We need to bring a meaningful

> and consistent standards and assessments strategy to career and technical education. Outcomes such as . . . skills attainment, attainment of industry-recognized credentials . . . Student achievement would benefit from investments in assessment systems that take into account more than just academic skills, for example, skills that will be important for young people's future employability. (p. 9)

Purpose of the Study

The purpose of this study is to determine if the IT teachers in the classroom have the necessary preparation as identified by the national skill standards competencies to prepare IT students for their world of work. Therefore, the researcher will compare Chicago Public Schools (CPS) IT teachers' preparation, skills, experience, and general background with national technology skill standards competencies.

Research Questions

This study will be designed to answer the following research questions:

1. To what extent do the CPS IT teachers perceive that they have the preparation, experience, skills, and general background to implement the NETS competencies for IT students enrolled in CPS IT courses?
2. Does the gender of IT teachers make a difference with respect to preparation, experience, skills, and general

background in implementing NETS, NSBE, and SCANS competencies?

3. Is there a relationship between IT teachers' total years of teaching experience and their perceptions of their preparation, and skills in implementing NETS, NSBE, and SCANS competencies?

4. Is there a relationship between years of IT teaching experience and teachers' perceptions of their preparation, and skills in implementing NETS, NSBE, and SCANS competencies?

5. What professional development training do the CPS IT teachers identify as being desirable to enable them to become ready to implement the NETS, NSBE, and SCANS competencies?

Definition of Terms

Application Software: Software that enables the microcomputer to be used for such applications as word processing, spreadsheets, databases, and graphics.

Assessment: Refers to the tools and methods used to gather information. Assessing is the process of gathering data to measure identified goals and expected results.

Experience: Active participation in events or activities (courses, workshops, etc.), leading to the accumulation of IT knowledge and skills.

General Background: A person's total IT experience, education, and knowledge of IT.

Information Technology (IT): The development, installation, and implementation of computer systems and applications.

National standards skills: Defines within a content area or discipline what learners or practitioners should know and be able to do. Performance standards are specific statements about a desired or expected level or quality of performance.

NETS: National Educational Technology Standards describe what students and teachers should know about technology and be able to do with technology.

Needs assessment: The process of determining the gaps in student and staff performance and figuring out which staff skills and competencies are necessary to eliminate the performance gaps.

Preparation: The act or process of preparing to be an IT teacher; readiness.

Professional development: Continuous improvement in technology skills and curriculum integration.

Delimitations

This study will be limited to CPS IT teachers in the Chicago secondary educational system for determining their perceived readiness to implement the national IT skills and standards competency requirements.

Limitations

The conclusions will be limited to CPS IT teachers who teach information processing courses. Therefore, other IT teachers who teach computer programming and business networking systems are not included.

Significance of Study

This study will aid in the development of IT teachers training by identifying types and levels of training needed by IT teachers. This training is crucial for IT teachers to be able to impart current IT industry trends and applications to IT students. The following studies' recommendations show the potential significance for this study.

Jao (2001) recommended that a study be conducted to investigate inservice teachers' attitude changes and confidence levels toward technology standards and instructional software applications after a formal training course (pp. 80-83). Jao (2001) also recommended that an

additional study be done using the 2000 educational technology standards released by ISTE (p. 83).

Kuschel (1994) recommended the following:

> Business educators in the Northwestern United States should also be surveyed to learn the degree of implementation of technology in their classrooms and participation in technology inservice courses. Studies could then be performed to expose relationships among levels of computer attitudes and computer literacy and technology implementation/technology inservice participation variables. (p. ii)

Parker (1998) used a proportional stratified sample questionnaire and received the following recommendations:

> (1) The NBEA, teacher education institutions, and departments of education, state and regional business education associations, and other related organizations should evaluate and/or develop comprehensive plans for (a) increasing all business teachers' awareness of the NSBE and (b) promoting benefits of implementing the NSBE to enhance business programs. (2) The NBEA, teacher institutions, state and regional associations, and other related organizations should evaluate current NSBE seminars and other programs to determine their effectiveness in emphasizing the value of the NSBE and in instructing business teachers in implementing the standards. . . . (6) Further research should be conducted on why teachers are not implementing the NSBE. (n.p.)

Williams (2000) assessed whether curriculum changes had been made by the National Association of Business Teacher Education (NABTE) institutes. Williams finding was "that 65% respondents changed curriculum and experienced increase enrollment of 16.4%." The reason given for adopting the NSBE was to keep curriculum current as well as

"to comply with accreditation and state standards" (p. ii). The study recommended that further research should be conducted to study the changes occurring in business education.

Mitchell (2001) reviewed the SCANS to determine the importance of workplace skills and competencies for entry-level employment. By using a stratified random sampling procedure, Mitchell came to the conclusion that there should be a closer collaboration between educators and employers to eliminate the disparity regarding knowledge and skills needed in the workplace (pp. 132-133).

While these studies' recommendations provide groundwork for the proposed study. Stasz (1999) states that the practices of the classroom are influenced by the broader institutional context; therefore, it becomes vital to gather data at multiple levels (the classroom, school, district, and state) and from a variety of participants (policymakers, school administrators, employers, teachers, and students). A school's samples might include program forms that have been less studied, such as cluster arrangements and career majors. The design of the study could "utilize multiple data gathering activities and sources of data such as semi-structured interviews, teacher surveys, classroom observations, teacher activity logs,

student transcripts and surveys, student work, student records and documents" (Stasz, 1999, p. 5). This study should in fact address CPS district in-service teachers' perception for implementation of national skill standards as well as their desired staff development. As a teacher of technology, I can offer some perceptions of my own.

Researcher's Perspective

This study will help organize and determine needed IT training for CPS IT teachers. It will provide an avenue to fulfill part of my job responsibilities as an Education-to-Careers Information Technology Program Manager who oversees the Information Technology End User, formerly known as Information Processing teachers. Part of my job responsibility is to arrange significant and relevant IT training to IT teachers so they may impart such to the IT students. My teaching and supervising experience has expanded over 25 years in the area of technology. I have taught information processing at an adult training center as well as at the secondary and post-secondary levels. In the process of teaching and supervising technology, I have become a life-long learner because technology is a rapidly changing field. I have learned that teacher development is costly and time consuming.

The assumption that each teacher has the funds and time to stay current is unrealistic; therefore, a procedure should be put into place to ease the burden. This may not eliminate all the barriers of continued educational efforts. The district should provide staff development regarding the latest software application and procedures. To ensure that students are receiving the latest technology application and procedures, teachers also should be given a voice in their IT development because to offer courses that are irrelevant to their needs would defeat the purpose.

CHAPTER 2

LITERATURE REVIEW

This chapter includes a brief overview of the vocational career-related programs background, legislations, research purpose, assessment, strategies, and methods in addition to the national, state, and local skill standards needed by students to successful compete in today's workplace. It is a continuous effort for teachers, industry, and students in an attempt to successfully meet national, state, and local IT skill standards. This chapter address students' skill standards, teachers' skill standards, and outcomes to IT skill standards.

Vocational and Other Career-related Programs Background

Various researchers have identified the essence of vocational and technical education programs. Vocational education programs prepare individuals to enter into the labor market (Legal Information Institute, n.d.). Lynch (2000) defined *vocational education* as "a term usually used in secondary schools to identify curriculum programs designed to prepare students to acquire an education and job skills which enable them to enter employment during and

immediately upon completing high school"(p. 155). Vocational education provides a setting for acquiring technical skills needed to enhance students' performance levels (Legal Information Institute, n.d.).

Lynch (2000) stated that during the 21st century, high school career and technical education had four purposes: (a) to provide career exploration and planning; (b) to enhance academic achievement and motivation to learn more; (c) to acquire generic work competencies and skills useful for employment; and (d) to establish pathways for continuing education and lifelong learning (pp. 172-173). The purpose of vocational education is to provide an avenue where learners can acquire useful technical skills needed to succeed in life.

Over the years legislation has responded to political, social, and economic pressures to meet the needs of our citizens and thus has shaped the course of present-day vocational educational programs. The following is a description of the legislation that impacted vocational education (Federal Programs for Education and Related Activities, 1995, pp. 1-9). NAVE (2004) stated,

> The Carl D. Perkins Vocational and Technical Act of 1990 focused on integrating academic and vocational proficiencies, and the 1998 Perkins Act made rigorous academic standards and accountability additional priorities for career and technical education. (p. 1)

Several other legislative acts preceded the Perkins Act.

The Smith-Hughes Act (1917) was initiated by Senator Hoke Smith and House Representative Dudley M. Hughes when they requested that a report from the Vocational Education committee be printed. The Conference report read in part:

> The bill (S. 703) to provide for the promotion of Vocational Education; to provide for cooperation with the States in the promotion of such education in Agriculture and the trades and industries; to provide for cooperation with the States in the preparation of teachers of Vocational subjects; and to appropriate money and regulate its expenditure (Senate Document 711, 1917, p. 1).

The aim of the Smith-Hughes Act was to provide grants to states for support of vocational education to meet the needs of students. A year later, the Vocational Rehabilitation Act (1918) was developed to rehabilitate World War I veterans through vocational training grants to provide a smooth transition into the world of work. The Smith Bankhead Act in 1920 provided grants to states for vocational rehabilitation programs. The Vocational Rehabilitation Act of 1943 provided assistance to disabled veterans. In 1943, The George-Barden Act was passed to expanded federal support of vocational education. This Act opened the door for further development of vocational education. In 1944, the G. I. Bill provided federal

government aid for World War II veterans to reenter civilian life.

In 1956, the Health Amendment Act was passed to amend the George-Barden Act and became Title II for Vocational Education in practical nursing training. The Vocational Education for the Fishing Industry law of 1956 amended the George-Barden Act and provided funds for vocational education in the fishery trades and industry and distributive occupations. The National Defense Education Act (NDEA), Title VIII of 1958, became Title II of the George-Barden Act. It encouraged vocational schools to train technicians. It in turn was used to "encourage and assist in the expansion and improvement of educational programs to meet critical National needs" (Perry, 2002, p. 27). The NDEA provided assistance to state and local school systems to strengthen instruction in science, mathematics, modern foreign languages, and other critical subjects; to improve services such as guidance; to provide counseling; to provide testing services and training institutes; and to offer higher education student loans and fellowships within vocational education programs (Federal Programs for Education and Related Activities, 1995, pp. 3-4). NDEA also provided for the foreign language study and training offered by colleges and universities; experimentation and

dissemination of information on more effective utilization of television, motion pictures, and related media for educational purposes; and vocational education for technical occupations necessary to national defense. Vocational programs were developed to train for highly-skilled technical fields relating to scientific knowledge that would work toward the national defense.

The Department of Education's Area Redevelopment Act of the 1960s extended the NDEA by providing training through existing vocational education facilities or, if the state or local area preferred, through private institutions. The Manpower Development and Training Act of 1962 funded training under the Department of Education office of Administration of Vocational Education. President John F. Kennedy implemented the Vocational Education Act of 1963. President Kennedy put together an advisory panel to evaluate and make recommendations about current vocational education programs. The Vocational Education Act (VEA) of 1976 amended the 1963 VEA act by establishing the National Occupation Coordination Committee and State Occupation and Coordination Committee to evaluate demands in the job market. The Manpower Development Training Act related to manpower requirements, resources, development and

utilization of such, while the VEA worked to strengthen and improved the quality of vocational education in the nation.

The purpose of the Carl Perkins Act of 1984 was to strengthen and expand the economic base of the nation. It was to "develop human resources, reduce structural unemployment, increase productivity and strengthen the nation's defense capabilities by assisting the states to expand, improve and update high-quality programs of vocation-technical education" (Perry, 2002, p. 24). The Carl Perkins Act and Vocational and the Applied Technology Education Act amendments of 1990 provided secondary, post-secondary, and adult education vocational programs with federal assistance. The Carl Perkins Act consists of seven sections as follows: (a) Title 1: state administration provisions (75% of basic state grant goes to local education agencies, area vocational-technical schools, and post-secondary institutions and 1% goes to vocational education programs in correctional facilities); (b) Title II: use of basic state grant (may be used to promote technical preparation and vocational student organizations); (c) Title III: special populations (business-labor-education partnerships, tech prep education, lighthouse schools, and tribally controlled post-secondary vocational institutions); (d) Title IV:

national programs (academic-vocational integration and promoting articulation between school and work); (e) Title V: general provisions (states may use funds under Vocational Education Act, Job Training Partnership Act, and Wagner Peyser Act for coordinating services); (f) Title VI: miscellaneous provisions; and (g) Title VII: effective date - July 1, 1991 (Vocational Educational Legislation, 1950-1990, pp. 4-7). The 1994 School-to-Work opportunities Act was created to serve as an avenue to education that highlights hands-on learning and high academic standards for the teaching of skills. The Carl D. Perkins Vocational and Technical Education Act of 1998 (Perkins III) restructured programs, improving student achievement and preparation for postsecondary education. Further learning and careers are the central goals of the new vision (Ivy, 2002, p. 12). The national framework for the development of opportunities programs systems in all states was to foster an effective transition into the world of work.

Purpose for Legislative Acts Concerning Vocational Education

The purposes of vocational education legislation are to develop more fully the academic, vocational, and technical skills of secondary and postsecondary students;

to build on the efforts of states and localities to develop challenging academic standards; to promote the development of services and activities that integrate academic, vocational, and technical instruction; to increase state and local flexibility in providing services and activities designed to develop, implement, and improve vocational and technical education, including tech-prep education; and to disseminate national research and provide professional development and technical assistance that will improve vocational and technical education programs, services, and activities (Legal Information Institute, n.d.).

Custer, Ruhland, and Stewart (1997) stated, "Federal and state initiatives have been developed to restructure education including Goals 2000, School-to-Work Opportunities Act, and Title III-Part E of the Carl D. Perkins Vocational and Applied Education Act" (p. 2). The Carl D. Perkins Vocational and Technical Education Act (Perkins III) requires that each state establish a performance accountability system to gauge and monitor the state's progress in achieving goals in vocational and technical assessment. States must provide data showing their progress as part of the accountability system (Vocational Education Training News, 1999). While the National Assessment of Vocational Education (NAVE) was

charged with evaluating the impact of the Perkins III and making a report to Congress by July 2002, the Perkins III also is focused on changing how students learn and what they learn as well what teachers do to facilitate that learning (Stasz, 1999, p. 1). The goal of the evaluation was to examine the principal themes and issues related to assessing quality of vocational education (with an emphasis on teachers and teaching); to lay out a research plan to assess quality practice; and to discuss the conceptual, methodological, and practical challenges to conducting the research (Stasz, 1999, p. 1).

Vocational Education Research Assessments, Strategies, and Methods

The effectiveness of any program is dependent upon accountability. Each program should be designed for specific purposes. When a program accomplishes what it is designed to accomplish, it can be considered effective. This is looked upon as *accountability*. Any time a program is not accountable, it is considered to be a waste of the taxpayers' money and time. Vocational education programs were developed in order to improve our society's way of life, making it necessary that these programs be reviewed

from time to time to guarantee that desired goals and purposes are accomplished (Lovejoy, 1994, p. 12).

Brustein (as cited in Custer et al., 1997) stated, "The Department of Education and Office of Vocational and Adult Education have provided guidelines for evaluating Tech Prep of Vocational and Adult Education initiatives" (p. 3). The seven guidelines are: "(a) identifying program characteristics, (b) deciding about expected outcomes, (c) anticipating possible outcomes, (d) providing decisions that may result from the evaluation, (e) identifying information sources, (f) summarizing, and (g) presenting the information" (Custer et al., 1997, p. 3). A number of significant challenges face any evaluation of the quality of vocational education in high schools in order to be sensitive to issues of teachers and teaching practice. These include the following:

> How to define quality, how to measure student outcomes or learning, how to define "vocational" programs and students, how to measure instructional practice, how to measure teacher quality, and the question of how the relationships between teaching practice and student outcomes could be answered. (Stasz, 1999, p. 7)

"Testing and assessment practices in secondary vocational education differ considerably from the rest of education in their features, origins and application" (Vocational Education Journal, 1995, p. 30). Vocational

education programs have always used the current assessment practices that are being used for the rest of the educational core subjects as alternative forms of assessment. Those assessment methods include portfolios, observations by teachers, student profiles, evaluation of projects, ratings of students in class, and organized events (Vocational Education Journal, p. 4).

Students' Skill Standards

In this section, specific focus will be on the national, state, and local skill standards students need to take into the world of work. The Vocational Education Journal (1995) pointed out that "the range of assessment methods in vocational education includes preparation of student profiles and portfolios, teacher observations and ratings of students in class, evaluated student projects and even organized competitive events" (p. 31). Often the assessments are designed to measure a student's knowledge and skills required for a particular job and not how he or she performs relative to other students.

National

ISTE/NETS standards for students cover the following: "(I) basic operations and concepts; (II) social, ethical, and human issues; (III) technology productivity tools; (IV)

technology communications tools; (V) technology research tools; and (VI) technology problem-solving and decision-making tools" (ISTE, 2000, pp. 4-5). Each of the NETS standards has a correspondent performance indicator as listed below.

(a) Students are to demonstrate a sound understanding of the nature and operation of technology systems. Students are to be proficient in the use of technology.

(b) Students should understand the ethical, cultural, and societal issues related to technology, students should practice responsible use of technology systems, information and software, students should develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

(c) Students use technology tools to enhance learning, increase productivity, and promote creativity, students use productivity tools to collaborate in construction technology-enhanced models, preparing publications, and producing other creative works.

(d) Students use telecommunications to collaborate, publish, and interact with peers, experts, and other

audiences, students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

(e) Students use technology to locate, evaluate, and collect information from a variety of sources, students use technology tools to process data and report results, students evaluate and select new information resources and technological innovations based on the appropriateness to specific tasks.

(f) Students use technology resources for solving problems and making informed decisions, students employ technology in the development of strategies for solving problems in the real world.

(International Society for Technology in Education, 2000, pp. 4-5)

The ISBE (2002) NETS for students provides an avenue for students "to live, learn and work successfully in an increasingly complex and information-rich society" (p. 1) with the hope that students will use technology efficiently and effectively throughout their lives. NETS would like for students to become:

> (a) capable information technology users; (b) information seekers, analyzers, and evaluators; (c) problem solvers and decision makers; (d) creative and effective users of productivity tools; (e) communicators, collaborators, publishers, and

> producers; and (f) informed, responsible, and contributing citizens. (NETS, 2002 p. 1)

The National Association of State Directors of Career and Technical Education Consortium (NASDCTEc) listed their expectations for the IT students through the States' Career Clusters initiative. The Career Clusters provide the students with cluster pathways knowledge and skills (KS) statements. Those KS statements are divided into: (a) measurement criteria and (b) performance elements to demonstration desired knowledge (NASDCTEc, 2003). The NASDCTEc Career Clusters provides curriculum framework and supportive materials for teachers while ensuring that students learn specific knowledge and skills.

The next report reviewed was the SCANS. This report called for graduates to have competencies in different areas and successful application of technology (U.S. Department of Labor, 1992). SCANS has developed a three-part foundation: (a) basic skills, (b) thinking skills, and (c) personal qualities. *Basic skills* include reading, writing, arithmetic, mathematics, and speaking. *Thinking skills* consist of students having the ability to learn, reason, think creatively, make decisions, solve problems, and listen. *Personal qualities* require students to be individually responsible and to develop self-esteem, the

ability for self-management, sociability, honesty, and integrity.

In addition, SCANS requires five workplace competencies: (a) resources, (b) interpersonal, (c) information, (d) systems, and (e) technology. These five workplaces competencies encompass *resource* allocation with reference to time, money, materials, space, and staff. The *interpersonal* skills deal with teamwork, teaching others, serving customers, leading, negotiating, and working well with people from diverse backgrounds. The *information* competencies include the ability to acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information. *Systems* competencies require students to understand social, organizational, and technical systems; monitor and correct performance; and design and improve systems. The final competency is *technology*, in which the students are to select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment (Coomber, Crainer, & Dearlove, 2002).

The final national organization researched was National Business Education Association (NBEA), National Standards for Business Education (NSBE). NSBE consists of eleven academic areas:

Accounting: Ensure that students competently manage their companies' financial resources.

Business Law: Ensure that students understand the laws affecting business, families, and individuals.

Career Development: Ensure that students gain a development understanding of their own skill strength and weaknesses, the ever-evolving requirements of the workplace, and the relationship of lifelong learning to career success.

Communication: Ensure that students develop the skills needed to solve mathematical problems, analyze and interpret data, and apply sound decision-making skills in business.

Economic and Personal Finance: Ensure that students can use knowledge about the economy and about theories and management of economic systems to understand and manage their roles in these systems.

Entrepreneurship: Ensure that students develop an appreciation for the importance of recognizing and acting on new business opportunities, not only in small business but also in corporate environments.

Information Technology: Ensure that students develop the ability to analyze, synthesize, and evaluate situations at home, school, work, and then apply technology to solve problems and complete tasks efficiently and effectively.

International Business: Ensure that students understand the interrelatedness of one's country's political policies and economic practices on another.

Management: Ensure that students learn to utilize human resources, effectively and efficiently in the global market place.

Marketing: Ensure that students realize the processes and functions involved in transferring business products or services to consumers, as well as gain a clearer picture of how key business functions are directly related to marketing activities. (NBEA, 2001, pp. ix-x)

The NBEA chose these academic contents because students must posses a basic knowledge of various business areas and how they interrelate (NBEA, 2001, p. ix).

The NSBE Information Technology content academic areas divisions' impact on society and software applications will be discussed. Information technology is the area that will be addressed throughout this paper. It is crucial for IT teachers to have the current technology knowledge and skills to impart them to the students. Whatever the IT teacher teaches the student will have some type on impact on today's society. The impact on society is division 1 of the Information Technology academic area. The achievement standard is to assess the impact of information technology on society (NBEA, 2001, p. 82). The performance expectations are as follows:

(a) Describe how new developments in information technology affect the supply/demand characteristics of the job market;

(b) Describe how information technology has changed organization structures;

(c) Describe how information technology has changed the breadth and level of worker responsibilities;

(d) Describe how information technology has transformed technology business processes and relationships;

(e) Describe how has changed the manner in which training is offered and implemented;

(f) Identify and evaluate information technology developments that have changed the way humans do their work; and

(g) Analyze and compare society's influence on information technology and information technology's influence on society (NBEA, 2001 p. 83).

The application software encompasses the information technology course focus; it is division 5 of NSBE Information Technology academic area. The application software achievement standards are to identify, evaluate, select, install, use, upgrade, and customize application software and to diagnose and solve problems resulting from an application software's installation and use (NBEA, 2001 p. 84).

The performance expectations are as follows.

(1) Use application software reference materials (e.g., online help, vendor Web sites, tutorials, and manuals),

(2) Use the collaborative features of application software to complete simulated or real organization tasks,

(3) Use advanced features of common application software,

(4) Use online data base, Web-based sources, and other information sources to access and retrieve information, and

(5) Evaluate the effectiveness of software to solve specific problems. (NBEA, 2001, p. 84)

In comparing the national agencies, there are differences and similarities. The national skill standards differences are as follows: NETS provides performance indicators, while career clusters are knowledge and skills-based. SCANS emphasis is on technology and employability skills, while NSBE is divided into several divisions with performance expectations. The similarities are that they all require students to develop current IT skill standards for them to become vital users of technology in the workplace. They also allow students to become empowered to learn relevant technology capabilities.

State

The Illinois Occupational Skill standards (IOSS) (2003) provides students with a performance area and

performance skills along with skill standards, performance elements, and performance assessment criteria. It also specifies the conditions of performance, work to be performed, and performance criteria of the skill standards component as critical work functions for an occupation or industry/occupational area. Skill standards are defined as follows. *Condition of performance* is "a comprehensive listing of the information, tools, equipment and other resources provided to the person(s) performing the work" (Hefferin, 2003, p. viii). *Work to be performed* is "an overview of the work to be performed in demonstrating the performance skill standard" (Hefferin, 2003, p. viii). The *performance criteria* evaluate whether the performance meets the standards. The *performance elements* specification gives a description of major elements or steps of the overall performance and any special assessment criteria associated with each element (Hefferin, 2003, p. viii). These workplace IT skill standards are required throughout all types of business and industry and in almost every occupation from entry-level work to top management.

The Illinois State Board of Education (ISBE) six essential learnings for technology (State of Illinois, 2000) are as follows. Each student is to become:

> (1) an information seeker, navigator, and evaluator; (2) a critical thinker, analyzer, and selector of information and technologies appropriate to the task; (3) a creator of knowledge using information resources and technology; (4) an effective communicator using a variety of appropriate technologies/media; (5) a technologist; and (6) a responsible citizen in a technological age. (State of Illinois, 2000, p. 21)

The IOSS is a roadmap that shows students and teachers how to demonstrate sophisticated usage of technology applications and trends. The ISBE essentials learning attempts to insure that teachers develop capable IT students. The local agency fulfilled the national and state requirements with more detailed and specific skill standards by utilizing task list and syllabi.

Local

The Chicago Public Schools (CPS) task listing encompasses keyboarding, word processing, spreadsheet, database, Internet communication, a presentation package, employability skills, and Web design. Students need to have these skills, but most important, teachers need to have the essential IT skills to impart to the students. As McCaslin and Parks (2002) states:

> The attention being given to teacher quality by the media, policymakers, and researchers is high. Improving teacher quality and teacher preparation is no simple task. The debates about teacher quality and how to produce quality teachers have

> been intense and have created numerous policy decisions at the local, state, and national levels. (p. 9)

Teachers' Skill Standards

In this section focus will be on the national state and local skill standards teachers need to effectively teach IT students. Teachers are responsible for preparing the learning environment and providing students guidance in developing technology skills and standards. Stasz (1999) suggested a research approach as follows based on the legislative directives coupled with the state of integration in practice:

> A focus on teachers and teaching that can describe integration at the level of classroom practice and identify relationships between teacher characteristics, instructional practices, and student attainments; . . . an emphasis on program types that have been less studied and potentially serve to restructure the whole school, such as career clusters, or career major strategies. (pp. 3-4)

National

The NETS standards for teachers are as follows:

> (I) learn technology operations and concepts; (II) plan and design learning environments and experiences; (III) teach and learn the curriculum; (IV) be proficient at assessment and evaluation; (V) be productive and professional in practice; and (VI) have knowledge of social, ethical, legal, and human issues. (ISTE, 2000, pp. 16-17)

Each of the NETS teacher standards has a correspondent performance indicator:

I. Demonstrate a sound understanding of technology operations and concepts.

   a. Introductory knowledge, skills, and understanding concepts related to technology (as describe in the ISTE NETS for students).

   b. Continual growth in technology knowledge and skills to stay abreast of current and emerging technologies.

II. Teachers plan and design effective learning environments and experiences supported by technology.

   a. Design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners.

   b. Apply current research on teaching and learning with technology when planning learning environments and experiences.

   c. Identify and locate technology resources and evaluate them for accuracy and suitability.

   d. Plan for the management of technology resources within the context of learning activities.

   e. Plan strategies to manage student learning in a technology-enhanced environment.

III. Teachers implement curriculum plans that include methods and strategies for applying technology to maximize students learning.

a. Facilitate technology-enhanced experiences that address content standards and student technology standards.

b. Use technology to support learner-centered strategies that address the diverse needs of students.

c. Apply technology to develop students' higher order skills and creativity.

IV. Manage student-learning activities in a technology-enhanced environment. Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.

a. Apply technology in assessing student learning of subject matter using a variety of assessment techniques.

b. Use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.

c. Apply multiple methods of evaluation to determine students' appropriate use of

technology resources for learning, communication, and productivity.

V. Teachers use technology to enhance their productivity and professional practice.
   a. Use technology resources to engage in ongoing professional development and lifelong learning.
   b. Continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning.
   c. Apply technology to increase productivity.
   d. Use technology to communicate and collaborate with peers, parents, and the larger community in order to nurture student learning.

VI. Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in pre-kindergarten - 12 schools and apply that understanding in practice.
   a. Model and teach legal and ethical practice related to technology use.
   b. Apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.

c. Identify and use technology resources that affirm diversity.

d. Promote safe and healthy use of technology resources.

e. Facilitate equitable access to technology resources for all students. (ISTE, 2000, p. 16-17)

The NETS for teachers goal is to illuminate concrete paths teachers may take to meet technological standards with a desire to foster an enriched learning environment that is supported by technology (ISTE, 2000).

Teachers' NETs standards support the students' NETS standards. They provide an avenue to achieve desired student outcomes as well as enhance teachers' techniques and application. The NSBE resource material was developed to provide teachers with measurement tools, to raise the level of competency, and to enhance curriculum.

The other national agency is the U.S. Department of Labor, which states that the primary objective of SCANS skills and competencies is to assist teachers in understanding how curriculum and instruction must change to enable students to develop "high performing skills needed to succeed in the high performance workplace" (Academic Innovations, 2000, p. 1). The national agencies aim at

providing teachers with current knowledge and use of skill standards to improve delivery of IT concepts and applications to students.

The final national agency discussed is the National Business Education Association (NBEA), whose essential mission is "to ensure that students and adults are afforded equal access to fundamental business knowledge and skills and therefore, an equal opportunity for success in life" (NBEA, 2001, p. vii). The NBEA "is devoted exclusively to serving individual and groups engaged in instruction, administration, research and dissemination of information for and about business" (NBEA, 2001, p. vii).

State

If teachers utilize ISBE's six essential learnings in a technological society, they should produce students who are information seekers, critical thinkers, effective communicators, and technologists. The students should be ready to replace the projected retiring workforce. In an attempt to provide productive citizens who can contribute to the development of today's IT workforce, these students should be able to identify and address different IT problems.

Alghazo (1999) stated that during 1998 and 1999, a midwestern university redesigned its teacher education

program to address technology using ISBE standards and the National Communication Association Technology Education (NCATE)/ISTE foundation standards. The study used both quantitative and qualitative instruments to examine the extent to which the program meets its goals and gender differences. The finding states that there was a significant improvement in students' technology competency. The significantly improved competencies were: (a) word processing; (b) spreadsheets; (c) computer skills; (d) communications; (e) graphing calculators; and (f) Web page construction. The recommendation is that solid "experience in learning with technology [is] needed" (Alghazo, 1999, p. iii-iv).

Local

The CPS syllabi introduce students to the Microsoft Office Suite fundamentals through the advanced features. CPS teachers provide knowledge and application on Web design and development. Additional training of teachers should assist in the development of students, which in turn would give back to the society of the future. CPS has implemented an e-learning department that works on IT curriculum integration across core subjects, but a need for advanced training for the IT teachers is desirable in order to enhance their knowledge and delivery of IT applications.

IT Skill Standards Outcomes

Within vocational education, there has been an emphasis on including measures of outcomes. These program outcomes must be specified in advance if program results are to be most effectively assessed (Custer et al., 1997, p. 12). The benefits of technology for students and teachers are well documented (Cradler & Bridgforth, 1997). Researchers Bozeman (1999b); Cradler & Bridgforth (1997) found that students who use critical thinking skills become independent at learning. When teachers act as technology leaders, the students use technology more successfully (Bozeman, 1999a; MacNeil & Delafield, 1998). As Eisenberg (2001) stated, "We want students to use technology flexibly and creatively. We want them to be able to size up a task, recognize how technology might help them to fulfill the task, and then use the technology to do so" (p. 46).

Students

Current literature states that to be employable, students must have technological skills that integrate academic skills. Students should be adept at high-thinking skills and problem solving. In other words, students must be able to analyze a situation and apply correct solutions for desired efficient and effective outcomes. Students must be able to communicate outcomes verbally and in written

form. The ISTE hopes that prior to completion, 12th grade students will be able to achieve the following outcomes:

1. Identify capabilities and limitations of contemporary and emerging technology resources and assess the potential to these systems and services to address personal, lifelong learning, and workplace needs (addresses standard II).
2. Make informed choices among technology systems, resources, and services (addresses standards I & II).
3. Analyze advantages and disadvantages of widespread use and reliance on technology in the workplace and in society as a whole (addresses standard II).
4. Demonstrate and advocate for legal and ethical behaviors among peers, family and community regarding the use of technology and information (addresses standard II).
5. Use technology tools and resources for managing and communicating personal/professional information (e.g., finances, schedules, addresses, purchases, correspondence) (addresses standards III & IV).
6. Evaluate technology-based options, including distance and distributed education, for lifelong learning (addresses standard V).

7. Routinely and effectively use online information resources to meet needs for collaboration, research, publications, communications, and productivity (addresses standards IV, V & VI).
8. Select and apply technology tools for research, information analysis, problem solving, and decision-making in content learning (addresses standards V & VI).
9. Investigate and apply expert systems, intelligent agents, and simulations in real-world situations (addresses standards III, V & VI),
10. Collaborate with peers, experts, and others to contribute to a content-related knowledge base by using technology to compile, synthesize, produce, and disseminate information, models, and other creative works (addresses d, e, & f). (International Society for Technology in Education, 2000, p. 5)

The NBEA has 12 outcomes for students. The outcomes that relate closely with information technology areas are as follows; students should be able to do the following: 1) develop an awareness of career opportunities and the lifelong learning skills that will enable students to become employable in a variety of business careers; 2) select and apply technology tools for making personal and

business decisions; 3) communicate effectively as writers, listeners, and speakers in diverse social and business settings; 4) appreciate the value of the entrepreneurial spirit, both in the small business and the corporate environment; 5) understand that the various functions of a business are not separate but are interrelated, and that each one impacts the others; and 6) apply the critical thinking skills needed to function in students' multiple roles as citizens, consumers, workers, managers, business owners, and directors of their own economic future (NBEA, 2001 p. viii).

For SCANS, the desired outcome was for graduates to have foundations and workplace and technology competencies. ISTE NETS, NBEA NSBE, and SCANS have fostered outcomes for students to have an opportunity to accomplish technology skill standards for use in their personal and professional lives.

Teachers

The overall desired outcome for IT teachers is to increase teacher capacities to enhance and integrate technology effectively into instruction. CPS's e-learning department is working closely with ISTE in developing symposia and conferences that will address current IT topics, trends, and applications for all teachers'

professional development to be used in integrating technology throughout core subjects.

Relevant Dissertation Studies

In reviewing related dissertations studies, six were relevant to Career and Technical Education (CTE), vocational educational history, ISTE NETS, SCANS, NABTE and NBEA (Baker, 1996; Cunningham, 2001; Kuschel, 1994, Mitchell, 2001; Perry, 2002; & Ury, 2003). Perry (2002) and Cunningham (2001) directly focused on the history of vocational education legislation. Kuschel (1994) concentrated on teachers' attitudes and confidence levels toward technology standards. Ury (2003) focused on the NETS standards for Administrators. Baker (1996) focused on high school graduates' perception of secondary education programs effectiveness. Parker (1998) focused on NBEA and NSBE effectiveness, awareness, and use.

Ury (2003) researched the validity and reliability of computer usage and performance level as they relate to the NETS for Administrators by way of a survey; he found NETS*A to be a valid and reliable instrument (p. vii). Ury (2003) surveyed school administrators concerning NETS by way of a self-reported performance of NETS*A and use of computers and recommended that some of the NETS*A may apply to public

school administration but at a different level than a building principal (pp. 117-118).

Perry (2002) investigated vocational education federal legislation as it relates to support, political climate, and economic needs. The findings reiterated that vocational education is the "primary method for training the American workforce" (pp. ii, iii). Cunningham (2001) reviewed current vocational education trends while outlining the need to maintain successful vocational education programs (pp. iii, iv). Cunningham (2001) recommended "that with the trends indicating an increase in students pursuing additional education, vocational curriculums will have to be updated and modified to include changes in technology . . . . Vocational curriculum content is consistently changing with technology" (pp. 63-64).

Mitchell (2001) reviewed the SCANS to determine the importance of workplace skills and competencies for entry-level employment. By using a stratified random sampling procedure, Mitchell concluded that there is a "significant difference between students' and employers' perception of the importance of entry-level workplace skills in the area of basic skills, thinking skills, resource skills, systems and technology skills, and informational skills," with the students perceiving the skills to be more important than

employers. Mitchell's recommendation was that "there should be a closer collaboration between educators and employers to eliminate the disparity regarding knowledge and skills needed in the workplace" (pp. 132-133).

Kuschel (1994) found a significant difference between computer experience groups for computer anxiety and attitude. No significant difference was found between age group or gender for computer attitude and literacy variables. A significant relationship was found between computer literacy and attitude variables. Kuschel recommended that "Studies could then be performed to expose relationships among levels of computer attitudes and computer literacy and technology implementation/technology inservice participation variables" (p. ii).

Baker's survey (1996) was based on SCANS skills. The findings indicate that students' perceptions showed significant differences in all three domains:

> a) development of foundational skills; b) development of workplace competencies; and c) preparation of students with the necessary skills to succeed in post-secondary education; and the vocational school respondents perceived their education program to be more effective in the development of technology skills. (Baker, p. iv)

Parker (1998) used a proportional stratified sample questionnaire and found that:

(a) teachers who were aware of and valued the NSBE were more likely to implement it; (b) members of NBEA were not more likely to implement NSBE; (c) a low number of teachers implemented the NSBE; and (d) some teachers had no access to the NSBE. Some of Parker's recommendations were as follows:

> 1) The NBEA, teacher education institutions, and departments of education, state and regional business education associations, and other related organizations should evaluate and/or develop comprehensive plans for (a) increasing all business teachers' awareness of the NSBE and (b) promoting benefits of implementing the NSBE to enhance business programs. . . . (6) Further research should be conducted on why teachers are not implementing the NSBE. (1998, n.p.)

These dissertation recommendations provide groundwork for the proposed study. As a system, we are charged with providing adequate staff development to enhance teachers IT delivery and development free of charge. Otherwise, we are doing students an injustice by having inadequate teachers. The research shows that teachers who are formally trained are move confident and better providers of applications skills and information.

Summary

NETS and NSBE attempt to have teachers deliver national goals and guidelines to students and to demonstrate skills and standards for today's technology.

For SCANS skills, the teachers should provide students with insight into developing the basic employability and technology skills for success in the world of work. The ISBE six essentials assist teachers in leading students into the 21st century digital age with the skills and standards that are adaptable and desirable. State skills and standards assist teachers in successfully delivering necessary national skill standards to students. Local agencies should provide curriculum and staff development of current IT industry application and trends to teachers through various avenues that should reflect a change in students' outcomes. Defining skill standards provides the educational system and industry with common language. The standards should define certain actions and qualities. They must be taught and measured. All standards should be accurate, reflective, specific, measurable, performance-based, and understandable. Skill standards should be assessed to measure whether the standards have been met.

CHAPTER 3

METHODOLOGY

In 2002, the International Society for Technology in Education (ISTE) along with the Professional Standards Committee initiated the National Educational Technology Standards (NETS). These standards were funded by the U.S. Department of Education to prepare tomorrow's students and teachers to use technology effectively and efficiently (International Society for Technology in Education, 2000). All IT teachers should have a working knowledge of computing concepts and productivity software packages in order to effectively assist IT students in integrating, accessing, retrieving, assessing, and applying technological resources.

The present study examined the perceived readiness of Chicago Public Schools IT teachers to implement the NETS, NSBE, and SCANS competencies for CPS IT students; and identified the type of professional development teachers believe is necessary to enable them to become better prepared.

The data focused on answers to five major research questions:

1. To what extent do the CPS IT teachers perceive that they have the preparation, and skills to implement the NETS, NSBE, and SCANS competencies for IT students enrolled in CPS IT courses?
2. Does the gender of IT teachers make a difference with respect to preparation, experience, skills, and general background in implementing NETS, NSBE, and SCANS competencies?
3. Is there a relationship between IT teachers' total years of teaching experience and their perception of their preparation and skills in implementing NETS, NSBE; and SCANS competencies?
4. Is there a relationship between years of IT teaching experience and teachers' perceptions of their preparation and skills in the educational system in implementing NETS, NSBE; and SCANS competencies?
5. What professional development training do the CPS IT teachers identify as being desirable to enable them to become more ready to implement the NETS, NSBE, and SCANS competencies?

Design

The methodology for this research was a non-experimental study that consisted of descriptive, comparative, and associational research questions. It provided a way to determine IT teachers' preparation, experience, skills, and general background in IT. The study also provided a professional development plan to address desired NETS, NSBE, and SCANS competencies.

Setting

According to the most recent statistics (2003), the Chicago Public School System had 613 schools serving over 434,419 students. In September 2003, there were 496 elementary schools, 99 high schools, and 18 charter schools. The racial breakdown among students was 50.3% African-American, 37.2% Latino, 9.1% White, 3.2% Asian/Pacific Islander, and 0.2% Native American. The poverty level of the district based on free and reduced lunch was 84.9%. Over 20.8% of the Illinois public school youth students attended CPS schools. Approximately, 104,223 students were enrolled in secondary schools. The teachers racial breakdown for the 2004-2005 school year was 47.3% White, 35.8% African-American, 13.2% Latino, 3.1% Asian/Pacific Islander and 0.6% Native American. There were

21.3 pupils per teacher in high school (*CPS at a Glance*, 2004). The school year is 39 weeks.

Accessible Population

The accessible population for this study consisted of IT teachers at CPS. The CPS IT teachers were stationed at 43 high schools throughout the city of Chicago. Approximately 125 teachers taught five classes of approximately 28 students daily. The target or theoretical population was probably all IT teachers in the US.

Sampling Procedure

The entire population of all the CPS IT teachers who teach end users (Information Processing) was selected for the survey due to the limited number of accessible respondents. Excluded from the study were computer programming, business systems networking, and telecommunications teachers.

Variables and Instrument

Independent variables addressed gender, IT teaching experience, and total teaching experience. All other survey questions were dependent variables. These included the IT preparation, IT skills, experience, need for staff development and general background.

Instrumentation

The researcher developed the questionnaire by using the American Institutes for Research handbook guide. The handbook was provided to educators as a resource to evaluate IT process and learning. The questionnaire (see Appendix A) consists of 50 items.

The researcher developed a questionnaire that covers five main clusters of items. These clusters are (a) IT teachers' preparation, (b) experience, (c) skills, (d) need for staff development, and (e) general background. Questions 1 through 11 focused on IT teachers' preparation or training in various IT areas such as advanced input/output devices, Microsoft Office Suite software package, curriculum specific applications, and formal IT training. Questions 12 through 16 were intended to record the IT experience of the IT teachers including years of IT teaching, certification, and refresher courses. Questions 17 through 25 provided an overview of the IT teachers' skills. The answers to questions 26 through 35 suggested desired staff development needed by the IT teachers. Questions 36 through 50 were aimed at providing general background information about overall teaching experience, courses taught, gender, and teachers' awareness and implementation of NETS, NSBE, and SCANS.

The survey included fill-ins and 4- and 5-point Likert rating scales. The 4-point Likert rating scales used numbers 1 through 4 to indicate comfort with various IT skills: 4 = very comfortable, 3 = moderately comfortable, 2 = would need some help to feel comfortable, and 1 = would need a lot of help to feel comfortable. The 5-point Likert rating scales use numbers 0 through 4 to indicate both the level of preparation and the level of need for staff development: 4 = extensive, 3 = quite a bit, 2 = some, 1 = minimal, and 0 = none.

The survey was designed by using the ISTE survey and rubric as well as the NAVE sample surveys. The ISTE "instrument was tested with a set of 112 preservice teachers in the second, third, and fourth year of their undergraduate teacher education program. Analysis of test data yielded high (alpha = .93) internal reliability" (ISTE, 2003, p. 95). The NAVE instrument was designed for persons with little or no formal training in research or evaluation. NAVE states, "The guide is not meant to be the key to conducting a perfect evaluation because there is no such thing as a perfect evaluation" (Report of the National Assessment of Vocational Education, 2004, p. 1).

The validity of the survey was established by way of the researcher's dissertation committee, a peer group, and

CPS Education to Careers information technology colleagues. They provided evidence for content validity by examining the questionnaire and providing feedback about the clarity and content.

To check the internal consistency reliability after the data were collected, three alphas were computed: one each for IT preparation, IT skills, and IT staff development. The Internal consistency reliability (Cronbach Alpha) was .90 for preparation, .83 for skills, and .89 for staff development. These alphas indicate good internal reliability or consistencies.

Data Collection Procedures

The 125 questionnaires were sent to CPS IT teachers using the interoffice mail system. A cover letter instructed the respondents to return the completed questionnaires to the researcher within 2 weeks using the interoffice mail system. A reminder letter and questionnaire were sent to help in the subsequent collection of non-returned questionnaires. The cover letter also assured teachers of the confidential nature of the study. The CPS interoffice mail system is like the U.S. postal service zip code structure; each regional area has several schools within its mail run. Therefore, the return

mail would not give an indication of any individual school or person(s).

Data Analysis

Research question 1 derived means, standard deviations, and percentages separately for each item in the preparation, experience, and skills section.

For question 2, I used *t* tests and chi-square to determine if there were IT teachers' gender differences in reference to the scores in preparation, skills, and other general background items. Chi-square was used when the item was dichotomous (yes or no), and *t* tests were used for the preparation, skills, and professional development scores. Levene's test was used to check the assumption of equality of variances.

The third question used Pearson bivariate correlations to determine whether there were relationships between IT teachers' total years of teaching experience and their preparation, and skills. The fourth question was about whether there were relationships between IT teachers' years of teaching IT and the above factors dealing with implementing NETS competencies. The final question, concerning professional development, was descriptive and

again used means, standard deviations, and percentages for each item in the staff development section.

CHAPTER 4

FINDINGS

Chapter 4 presents an analysis of the Chicago Public School (CPS) IT teachers' responses to the IT survey. The chapter has been divided into four sections: (a) population and return rates, (b) sample description, (c) statistical analysis of research questions, and (d) summary of survey results.

Population and Return Rates

In April 2005, 125 survey instruments, cover letters, and directions to return the survey via the interoffice mail system were sent to all CPS IT teachers citywide. Approximately three weeks later, follow-up letters were sent to all IT teachers who had not responded. Before the reminder, there were 37 returned usable surveys, and by mid-May, 39 more of the IT teachers had returned completed survey forms.

Table 1 shows a breakdown of the questionnaire return. The original lists of teachers provided by the Human Resource office contained 125 names. The interoffice mail

system was used to distribute the questionnaires. However, of the 125 questionnaires sent, 15 were returned as being non-deliverable because the teachers had retired or changed schools. Thus, of the 125 mailed, 110 (88%) were actually delivered. The resulting number of usable questionnaires was 76 (69% of those delivered) because 13 were returned blank, and 21 questionnaires were not returned; the latter two categories constituted non-participants to the survey. One completed survey came in long after the due date and is not included in the following statistics.

Table 1

Questionnaire Return Rate

Parameter	Number
On Original List	125
Undeliverable	15
Total Delivered	110
Not Returned	21
Returned Blank	13
Returned Completed	76
Usable Percentage Returned	69%

Sample Description

The information processing course categories that participants were asked to rate in terms of preparation, skills, and staff-development need were *Advanced Input/Output, Word Processing, Database, Spreadsheet, Desktop Publishing, Internet Software, Basic Operating System, CD-ROM Multimedia,* and *HTML/Web Page*. The IT preparation and staff development response selections were: *extensive* (4), *quite a bit* (3), *some* (2), *minimal* (1), and *none* (0). The IT skills response selections included *very comfortable* (3), *would need some help to feel comfortable* (2), *moderately comfortable, would need a lot of help to feel comfortable* (1).

The dichotomous (yes or no) survey questions were as follows: Have you taken any formal IT training courses? Are you Microsoft Office Specialist (MOS) certified? Do you teach courses other than IT courses? Are you aware of the National Technology Educational Standards (NETS), National Standards of Business Education (NSBE), and Secretary's Commission on Achieving Necessary Skills (SCANS)? Have you been formally trained on NETS, NSBE, and SCANS? Would you like to be formally trained on NETS, NSBE, and SCANS?

The sample characteristic, years taught, is displayed in 5-year increments from 0 to over 35. Figure 1 shows the

largest number of responses from those with 0-4 years of service. Of the 76 respondents, 16 (21%) had been teaching 0-4 years. The median years taught is contained within the 15-19 (17%) years range. Thus, the highest percentage of the respondents were new teachers in term of years of overall teaching, but the middle of the distribution was approximately 15 years. Of the 76 survey responses, 55 (73.3%) were female and 20 (26.7%) were male. One of the respondents did not indicate gender.

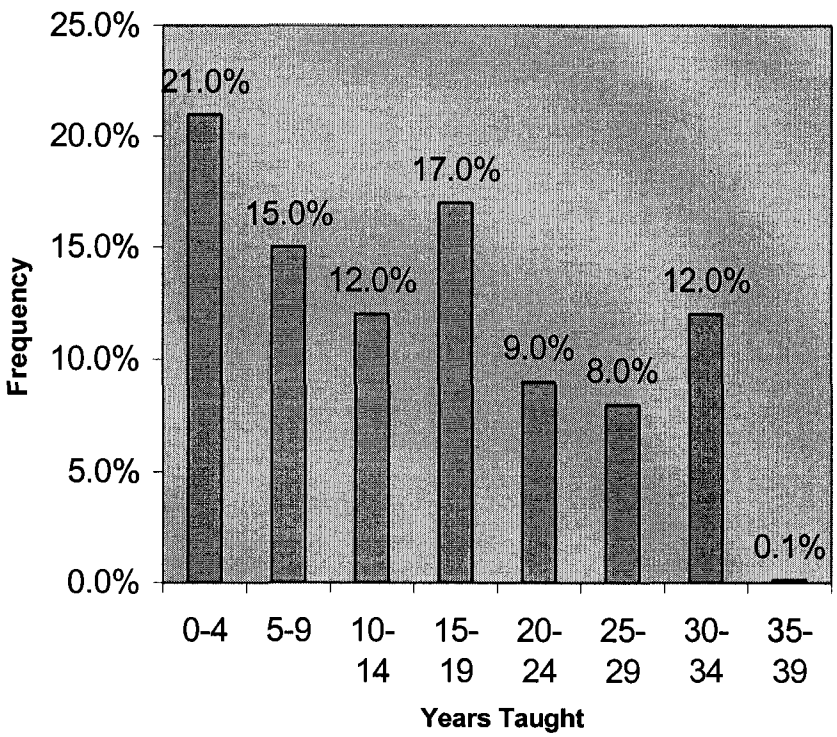

Figure 1. Distribution of years taught.

In Table 2, the *number of information technology courses taught daily* data show that somewhat less than 50% of the teachers taught 5 courses a day. Approximately 20%

of the IT teachers taught 3 courses and 77% taught 2 to 5 courses a day; 4.3% taught 6 IT classes a day. Of the 76 respondents, 6 left this item blank.

Table 2

Number of IT Courses Taught Daily

N	% 1 Course	% 2 Courses	% 3 Courses	% 4 Courses	% 5 Courses	% 6 Courses
76	14.3	7.1	20.0	7.1	42.9	4.3

Figure 2 describes the recentness of courses taken by the 76 respondents. The results indicate that 11 (17.7%) of respondents had not taken a refresher course within the last five years, 22 (about 36%) had taken refresher courses between 1 and 5 years before the survey, and 29 (46.8%) had taken refresher IT courses within the previous year.

Microsoft Certifications

The data showed that less than 30% of IT teachers were Microsoft Office Specialist (MOS) certified. Of the 28% teachers who were MOS certified, the Word certification was the number one certification held (28%). Excel and PowerPoint certification tied for second at 15%.

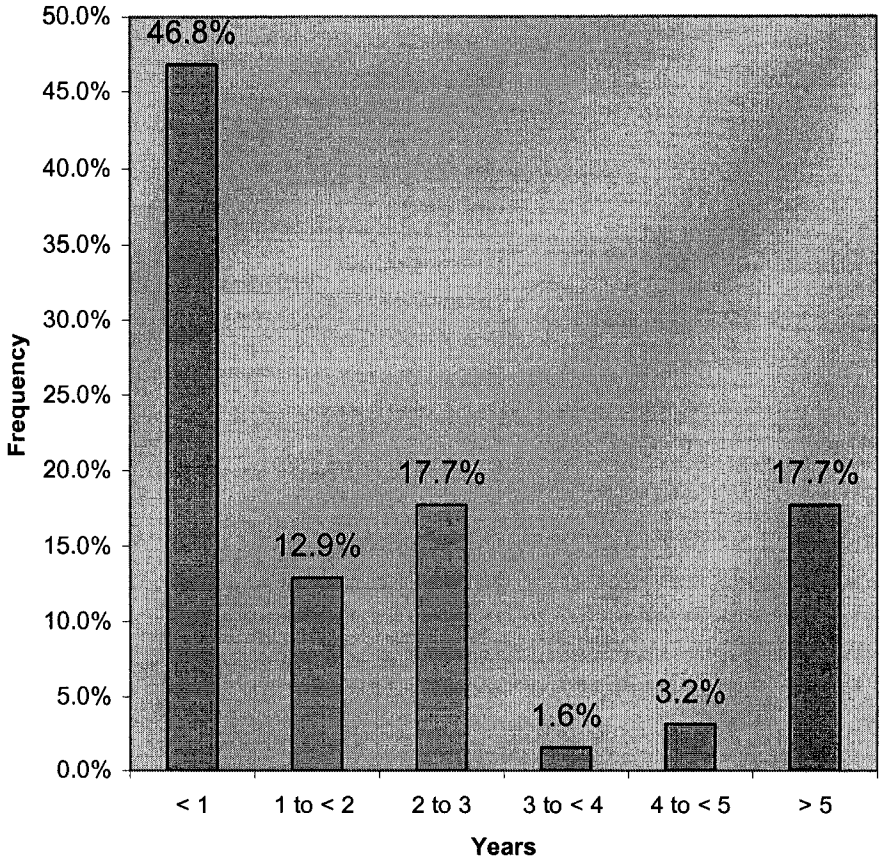

Figure 2. Years since respondents had taken an IT refresher course.

Statistical Analysis of Research Questions

Question 1

To what extent do the CPS IT teachers perceive that they have the preparation and skills to implement the NETS, NSBE, and SCANS competencies for IT students enrolled in CPS IT courses? Frequencies, percentages, means, and standard deviation were the statistical methods used to report these data.

Table 3 shows the IT teacher's preparation for implementing national IT standards. More than half of the participants said they had considerable preparation (*quite a bit* and *extensive*) with the following: Word Processing (90%), Spreadsheet (79%), Basic Operating System (66%), Internet Software (63%), Advanced Input/Output (61.1%), Database (58%), and Desktop Publishing (53%). Fewer than half rated their preparation with the CD-ROM Multimedia and HTML/Web Page categories as considerable; the average was only about "some" experience (a rating of 2).

Table 4 data show that almost all IT teachers were comfortable with Word Processing and Spreadsheet. About half the teachers needed help with HTML/Web Page development. The other two areas in which many teachers needed assistance were CD-ROM Multimedia Applications and Basic Operating System Techniques, where about 30% needed some or a lot of help.

Table 3

Distributions of Respondents by Preparation Variables

Categories	N	% 0-1	% 3-4	*M*	*SD*
Advanced Input/Output Devices	69	15.9	60.9	2.74	1.13
Word Processing	76	10.5	89.5	3.51	.78
Database	76	7.9	57.9	2.68	1.00
Spreadsheet	76	5.3	79.0	3.00	.87
Desktop Publishing	75	22.7	53.3	2.52	1.24
Internet Software	76	11.8	63.2	2.78	1.09
Basic Operating System Techniques	76	10.5	65.7	2.81	1.02
CD-ROM Multimedia Application	76	18.4	30.8	2.32	1.02
HTML/Web Page Development	68	29.4	35.3	2.07	1.22

Note. Ratings are based on a scale of 0 to 4 with 0 = none, 1 = minimal, 2 = some, 3 = quite a bit and 4 = extensive. Considerable = (3-4), Minimal = (0-1).

Question 2

Does the gender of IT teachers make a difference with respect to preparation, experience, skills, and general background in implementing NETS, NSBE, and SCANS competencies? The statistical methods used to report these data were independent *t* tests for preparation, experience, and skills; and chi-square for the general background.

Table 4

Distributions of Respondents by Skills Variables

Categories	N	% 1-2	% 3-4	*M*	*SD*
Advanced Input/Output Devices	75	21.3	78.7	3.13	.875
Word Processing	75	1.3	98.7	3.84	.401
Database	76	19,7	80.3	3.10	.740
Spreadsheet	76	1.3	98.7	3.53	.527
Desktop Publishing	76	21.0	78.9	3.11	.832
Internet Software	76	17.1	82.9	3.25	.802
Basic Operating System Techniques	75	29.3	70.7	3.05	.928
CD-ROM Multimedia Application	75	30.7	69.4	2.80	.929
HTML/Web Page Development	75	48	52.0	2.49	1.01

Note. Ratings are based on a scale of 1 to 4 with 1 = would need a lot of help to feel comfortable, 2 = would need some help to feel comfortable, 3 = moderately comfortable, and 4 = very comfortable. Needs help = (1-2), Comfortable = (3-4).

For the preparation variables, Levene's tests indicated that the assumption of equality of variances was not violated and equal variances were assumed. The results (see Table 5) indicate that there were no significant differences between males and females regarding any of the IT preparation areas needed for implementing the NETS, NSBE, and SCANS standards.

For the experience variables Levene's tests indicated that the assumption of equality of variances was not

violated and equal variances were assumed. The results (see Table 6) indicate that there was only one significant difference between males and females regarding IT experience in implementing the NETS, NSBE, and SCANS standards. The women had more years taught than men, t = 2.07, df = 71, p = .042.

Table 5

Comparison of Male and Female IT Preparation for Implementing National Standards

Categories	*M*	*SD*	*t*	*df*	*P*
Advanced Input/Output Devices			.073	66	.942
Males	2.74	1.15			
Females	2.71	1.14			
Word Processing			-1.40	73	.167
Males	3.30	1.08			
Females	3.58	.63			
Database			-.087	73	.931
Males	2.65	1.18			
Females	2.67	.92			
Spreadsheet			-.759	73	.451
Males	2.90	1.07			
Females	3.07	.79			
Desktop Publishing			-1.011	72	.315
Males	2.26	1.24			
Females	2.60	1.26			
Internet Software			.532	73	.596
Males	2.90	1.12			
Females	2.74	1.11			
Basic Operating System Techniques			.253	73	.801
Males	2.85	1.09			
Females	2.78	1.01			
CD-ROM Multimedia Application			-.034	73	.973
Male	2.30	1.17			
Female	2.30	.96			
HTML/Web Page Development			1.300	65	.198
Males	2.37	1.12			
Females	1.94	1.26			
Taken other formal IT training			.710	65	.480
Males	.82	.39			
Females	.70	.68			

n = 20 males and 55 females.

Table 6

Comparison of Male and Female IT Experience for Implementing National Standards

Categories	*M*	*SD*	*t*	*df*	*p*
Years taught IT subjects			-2.074	71	.042*
Male	7.08	5.7			
Female	11.31	8.4			
MOS certified			.977	73	.332
Male	.35	.49			
Female	.24	.43			
How many IT refresher courses			-.544	68	.588
Male	3.30	5.15			
Female	4.15	6.17			
Years since taking IT courses			-.168	59	.098
Male	2.75	2.11			
Female	3.67	1.78			

n = 20 males and 55 females. *$p<.05$

For skills, Levene's tests indicated that the assumption of equality of variances was not violated and equal variances were assumed. The results as displayed in Table 7 indicate that there was no significant difference between males and females regarding IT self-reported skills in implementing the NETS, NSBE, and SCANS standards.

Table 8 shows the crosstabulations and indicates that male and females were not statistically significantly different on awareness of NETS standards. No cells (.0%) had an expected count less than 5 and the minimum expected

count was 7.20 so chi-square was used. Thirteen males out of 20 (65%) and 35 females out of 55 (64%) were aware of the NETS (X^2 = .012, df = 1, N = 75, p =.913). Therefore, females and males seemed to be equally aware of the NETS standards.

Table 7

Comparison of Male and Female IT Skills for Implementing National Standards

Categories	*M*	*SD*	*t*	*df*	*p*
Advanced Input/Output Devices			1.068	72	.289
Male	3.30	.57			
Females	3.06	.96			
Word Processing			-1.838	73	.070
Male	3.70	.57			
Females	3.89	.31			
Database			.752	73	.454
Male	3.20	.70			
Females	3.05	.76			
Spreadsheet			-.327	73	.744
Male	3.50	.61			
Females	3.55	.50			
Desktop Publishing			-.124	73	.902
Male	3.10	.79			
Females	3.13	.86			
Internet Software			1.614	73	.111
Male	3.50	.69			
Females	3.16	.83			
Basic Operating System Techniques			1.185	72	.240
Male	3.25	.91			
Females	2.96	.93			
CD-ROM Multimedia Application			-.190	72	.850
Male	2.75	.97			
Females	2.80	.92			
HTML/Web Page Development			1.093	72	.278
Male	2.70	1.03			
Females	2.41	1.02			

n = 20 males and 55 females.

Table 8

Crosstabulation Analysis of NETS Standards Comparing Males and Females

Variable	*n*	Aware of	%	*p*	*n*	Formal training	%	*p*	*n*	Wants training	%	*p*
NETS				.913				.556				.716
Males	20	13	64%		15	0	0%		19	17	89%	
Females	55	35	65%		41	3	7%		53	44	83%	
Total	75	48	64%		56	3	5%		72	61	85%	

n = 20 males and 55 females.

The NETS formal training results indicate that again, males and females were not statistically significantly different. Because 2 cells (50.0%) had expected counts less than 5, and the minimum expected count was only .80, the Fisher exact test was used (p = .556). Females were not significantly more likely to be formally trained on NETS standards than males.

The results also indicate that there is not a statistically significant difference regarding male and female desire for formal training on NETS standards. One cell (25.0%) had expected counts less than 5 and the minimum expected count was only 2.90. Therefore, Fisher's exact test was used (p = .716); 89% of the males and 83% of the females desire formal training. Overall 85% of the teachers requested formal training on the NETS standards.

Table 9 indicates that males and females are not statistically significantly different on awareness of NSBE

standards. One cell (25.0%) had expected count less than 5, and the minimum expected count was only 4.95. Therefore, Fisher's exact test was used (p = .363); 16 (84%) of the males and 38 (70%) of the females were aware of the NSBE standards. Females seemed somewhat less aware of the NSBE standards but the difference was not significant.

The NSBE formal training results indicate that males and females are not statistically significantly different even though none (0%) of the males and 5 (12%) of the females had formal training. Because 2 cells (50.0%) had expected counts less than 5 and the minimum expected count was only 1.42, Fisher's exact test was used. Females are not significantly more formally trained on NSBE standards (p = 309). The results in Table 9 also indicate that there is not a statistically significant difference regarding male and female desire for formal training on NSBE standards. Because one cell (25.0%) had expected count less than 5 and the minimum expected count was only 3.43, Fisher's exact test was used (p = .491). The results were 17 out of 19 (89%) males and 42 (79%) of the females wanted training. Overall 82 % of the teachers requested formal training on the NSBE standards.

Table 9

Crosstabulation Analysis of NSBE Standards Comparing Males and Females

Variable	*n*	Aware of	%	*p*	*n*	Formal training	%	*p*	*N*	Wants training	%	*p*
NSBE				.363				.309				.491
Males	19	16	84%		17	0	0%		19	17	89%	
Females	54	38	70%		43	5	12%		53	42	79%	
Total	73	54	74%		60	5	8%		72	59	82%	

Table 10 indicates that males and females are not statistically significantly different on awareness of SCANS standards. One cell (25.0%) had expected count less than 5, and the minimum expected count was only 4.80, so Fisher's exact test was used (p = .224). Thirteen males out of 20 (65%) males and 44 females out of 55 (80%) were aware of the SCANS. Although, females seemed to be more aware of the SCANS standards, the difference was not statistically significant.

Table 10

Crosstabulation Analysis of SCANS Standards Comparing Males and Females

Variable	*N*	Aware of	%	*p*	*n*	Formal training	%	*p*	*n*	Wants training	%	*p*
SCANS				.224				.746				.739
Males	20	13	65%		15	5	33%		19	15	79%	
Females	55	44	80%		48	13	27%		51	42	82%	
Total	75	57	76%		63	18	29%		70	57	81%	

The SCANS formal training results indicate that males and females are not statistically significantly different. Because 1 cell (25.0%) had an expected count less than 5, and the minimum expected count was 4.29, the Fisher Exact test was used (p = .746). Males were not significantly more likely to be formally trained on SCANS standards.

The results also indicate that there is not a statistically significant difference regarding male and female desire for formal training on SCANS standards. Because 1 cell (25.0%) had an expected count less than 5, and the minimum expected count was only 3.53, the Fisher Exact test was used (p = .739). Females were not significantly more likely to want formal SCANS standards training.

Question 3.

Is there a relationship between IT teachers' total years of teaching experience and their perception of their preparation, and skills in implementing NETS, NSBE, and SCANS competencies? This study used correlation to determine whether there is a relationship. The correlations with preparation variables are shown in Table 11. Correlations with skills variables are shown in Table 12.

Question 4

Is there a relationship between years of IT teaching experience and teachers' perceptions of their preparation, and skills in implementing NETS, NSBE, and SCANS competencies? Correlation was the statistical method used to report these data.

To investigate if there were statistically significant associations between the preparation variables and all years taught and years taught IT, correlations were computed (see Table 11). None of the correlations of the preparation variables were significantly correlated with either all years taught or IT years taught. This indicates that, in general, we cannot predict from knowing years taught or years taught IT subjects whether a teacher's preparation was low, medium, or high.

Table 12 shows that there were no significant correlations between all years taught or years taught IT and any of the perceived skill variables.

With regard to needs for staff development, again none of the correlations were significant (see Table 13). There was no relation between total teaching years or teaching IT and the staff development variables.

Table 11

Correlations of All Years Taught and Years Taught IT With Each Preparation Variable

Preparation Variable	All Years Taught	Years Taught IT
Advanced Input Output	.06	.10
Word Processing	.12	-.04
Database etc.	-.07	-.06
Spreadsheet	-.00	-.06
Desktop Publishing	-.07	-.03
Internet Software	-.02	-.04
Basic Operating System Techniques	.14	.14
CD/ROM Multimedia Applications	-.00	.06
HTML/Web Page Development	-.21	-.13

* $p < .05$, ** $p < .01$.

Table 12

Correlations of All Years Taught and Years Taught IT with Each Skill Variable

Skill Variable	All Years Taught	Years Taught IT
Advanced Input Output	.03	.14
Word Processing	.08	.03
Database etc.	-.23	-.08
Spreadsheet	-.03	-.01
Desktop Publishing	-.02	.12
Internet Software	-.15	.04
Basic operating System Techniques	.06	.16
CD/ROM Multimedia Applications	.02	.16
HTML/Web Page Development	.11	.00

* $p < .05$, ** $p < .01$.

Table 13

Correlations of All Years Taught and Years Taught IT with Each Staff Development Variable

Staff Development Variable	All Years Taught	Years Taught IT
Advanced Input Output	-.09	-.16
Word Processing	-.19	-.11
Database etc.	.01	.05
Spreadsheet	-.10	.03
Desktop Publishing	-.03	-.13
Internet Software	-.14	.15
Basic Operating System Techniques	-.20	-.21
CD/ROM Multimedia Applications	-.03	.09
HTML/Web Page Development	-.07	-.05

* $p < .05$, ** $p < .01$.

Question 5

What professional development training do the CPS IT teachers identify as being desirable to enable them to become more ready to implement the NETS, NSBE, and SCANS competencies? The statistical methods used to report these data were means, standards deviation, and percentages.

Table 14 shows that the needed staff development is consistent with the skills data. The most desired area for staff development is for HTML/Web Page Development, with about 40% of teachers requesting "considerable" training and 50% more requesting "some." Thus, almost all the teachers seemed to want at least some training in web page development. About 60% of the participants also desired "some" training in CD-ROM Multimedia Applications, Desktop Publishing, Advanced Input/Output Devices, Database, Basic Operating System, and Spread Sheet, and 12-26% more requested "considerable" training in each of the areas. Even for word processing and Internet software training, 60-73% of teachers requested at least "some" training.

Table 14

Distribution of Respondents' Needed Staff Development

Categories	N	% 1-2	% 3-4	*M*	*SD*
Advanced Input/Output Devices	73	58.9	21.9	1.98	1.14
Word Processing	74	52.7	6.8	.91	1.04
Database	74	58.1	21.6	1.59	1.19
Spreadsheet	73	60.3	12.3	1.29	1.06
Desktop Publishing	75	60.0	22.6	1.61	1.13
Internet Software	73	54.8	17.8	1.35	1.15
Basic Operating System Techniques	73	63.0	19.2	1.59	1.10
CD-ROM Multimedia Application	74	62.2	25.7	1.80	1.05
HTML/Web Page Development	73	50.7	42.5	2.14	1.13

Note. Ratings based on a scale of 0 to 4 with 0 = none, 1 = minimal, 2 = some, 3 = quite a bit and 4 = extensive. Considerable = (3-4) Some = (1-2).

Participant Comments on the Open-Ended Questions

Table 15 shows that 68% of the survey respondents had no comments to the first open-ended question, which asked teachers what other aspects of staff development would help enhance their IT teaching. The 24 (32%) who did comment made a variety of statements that are grouped into six categories as shown in Table 15.

Table 15

Comments About Other Aspects of Staff Development to Enhance Your IT Teaching

Actual Comments	*N*	%

ADVANCE SOFTWARE APPLICATIONS	4	5
"A+ courses"		
"More Programming C & C++, JAVA"		
"Multimedia"		
"Advance topics in current technology"		
"I would like to know more about Networking our computers and the other hardware devices used to run the computer lab"		
WEB DESIGN	4	5
"Java Script, Dream Weaver"		
"Web Design Java Script"		
"To enhance my IT teaching, I would like to have staff development offered in Photoshop CS, FrontPage, Flash, and Dream Weaver"		
"HTML class/workshop, Dream Weaver, FrontPage"		
CERTIFICATION	5	7
"I would like to see various Microsoft certification programs offered free to IT teachers"		
"Become MOUS certified in word, power point, excel (MOS-Office Specialist)"		
"I would like a staff development on Macromedia; Flash, Fireworks, and MS Database"		
"I would like to be MOS certified as well as instruct students for MOS certification"		
"Advance courses in the above IT applications to keep current on software updates and get CPDU's or new MOUS certifications"		
INTEGRATION	4	5
"Integrated projects using Microsoft applications"		
"Designing standards based lessons and activities"		
"More incorporation of Reading into IT"		
"How to incorporate all this available technology in all areas of the curriculum"		
CONCERNS	4	5
"Observation of other IT classes, on-site training, and paid courses for enhanced training"		
"Hand on-training"		
"Have refresher classes that last at least a min. of 2 wks - preferably 4 wks"		
"It would be great to be reimbursed for certification study guides and exam fees!"		
SKILL STANDARDS	2	3
"Standards"		
"Workshops on MOS, NSBE, NETS, and SCANS"		
Total Comments	24	32
No Comment	52	68

N = 76

The comments focused on advanced software applications, web design, certification, integration, and skill standards.

The other staff development concerns were related to salary incentives, workshop timeframe, and method of delivery.

Table 16 provides the actual comments from the 15 out of 76 participants (20%) who added additional comments in the space provided at the end of the questionnaire. These comments focused on desired staff development such as

Table 16
Additional Comments

	N	%
OPEN ENDED QUESTION ACTUAL COMMENTS	15	20
"I am retiring as of June 2005" "I would like to take the MOUS certification exam through CPS" "This survey will help the instructional teaching of computer tech. Computer tech techniques are always changing. Extra training enhances classroom training for students."		
"Are you aware of the Model k-12 computer science curriculum just published by CSTA and ACM? "We are the tech crowd how come we're not using distance learning & on-line in-service"		
"Additional training in all IT courses along with land placement would be desirable" "I answer yes to 41-45 however, I would like more training in these areas." "Feel that more training should be offered."		
"As I mentioned on the reverse side, this is my 1st year teaching. I really enjoy it very much. I truly believe that DePaul University prepared me to be an outstanding teacher."		
"The IT staff development section reflects that I would like refresher training or updated training to introduce new software in these area if available."		
"The MOS certification exam should be made available to those who have not been able to take it."		
"I am very much aware of all these programs, however, I have not had much training; I have had some training. I would appreciate a workshop."		
"Training should be during regular work day with class coverage provided." "I would like to keep current on software updates"		
"I hope something comes of this survey"		
No Comment	51	80

N = 76

IT National Standards, advanced software applications such as Flash and Dream Weaver, and Web Design.

Summary of Survey Results

Out of the 110 delivered surveys, 76 responded with information concerning their National IT competencies. The survey consisted of 9 IT areas for each of 3 content topics: preparation, skill, and staff development needs. The survey addressed IT teachers' certification, refresher courses taken, and five major research questions. An overall finding was that the respondents' had relatively few MOS certifications. About half of the respondents had taken a refresher course in the last year. Less than 20% of the respondents had comments concerning the survey.

Research question one consisted of IT teachers' preparation and perception of their skills for implementing national skill standards competencies. On average approximately 60% of the teachers stated they are prepared to implement NETS, NSBE, and SCANS competencies. The teachers perceive they are considerably prepared in seven out of the nine areas with word processing being the most (89%). While in eight out of the nine areas, 70% of more of the teachers perceived they have the skills to implement NETS, NSBE, and SCANS competencies. The one area in which almost half the teacher's said they are lacking skills is in HTML and Web page design.

Research question two covered gender differences in IT preparation, and skills in implementing national IT skill standards competencies. Only one of the male-female comparisons was significant; females had more years of teaching experience. Research question three and four; correlated total years teaching; and years IT teaching with preparation, and skills impact on IT teachers' implementation of national IT skill standards competencies.

The IT teacher respondents' length of teaching ranged from 1 year to 36 years. The largest number had 1- to 4-years experience, but the median was about 15 years.

Research question five is comprised of IT teachers' awareness, and desired staff development to implement national skill standards competencies. More than 65% of the teachers were aware of each of the National Standards. Less than 10% of the teachers had formal training concerning NETS and NSBE, while less than 30% had formal training on SCANS. Overall, more than 80% indicated they would like to receive formal training on the NETS, NSBE, and SCANS Standards. More than 70% of the teachers stated that they needed at least some staff development in each the nine areas except word processing. The area of most need seemed to be HTML Web page development.

CHAPTER 5

DISCUSSION

This study examined the perceived readiness of Chicago Public Schools (CPS) instructional technology (IT) teachers to implement the NETS, NSBE, and SCANS competencies for CPS IT students. Further, the study identified professional development experiences teachers believe necessary to enable them to become better prepared to meet the relevant NETS, NSBE, and SCANS competencies. This research study used a non-experimental design that consisted of descriptive, comparative, and associational research questions to determine CPS IT teachers' preparation, experience, skills, and general background in IT. In support of this research study McKenzie (1999) states:

> There is far too little assessment being done to guide professional development. Most districts do not know the level of development already achieved by staff, let alone their preferences . . . A thoughtful assessment strategy helps to identify offerings that stand a chance of matching preferences, and then assessment makes it possible to steer the program forward. (p. 2)

This study addressed McKenzie's call for a thoughtful assessment as applied to the Chicago Public Schools IT faculty.

This chapter consists of four sections. The first section discusses the study's findings related to the literature and is organized by research question. The second section identifies implications concerning requested staff/professional development. The third section provides recommendations for future research. The final section suggests recommendations for practitioners in the field.

Findings

The accessible population for this study consisted of 125 CPS IT teachers stationed at 43 high schools throughout Chicago. The population of all the CPS IT teachers who teach IT students was selected for the survey due to the limited number of accessible respondents. A total of 76 IT teachers participated in the survey conducted between April 6 - May 6, 2005.

A survey instrument was used to collect the data used to evaluate CPS IT teachers' awareness and prior training concerning their education technology skill standards competencies. The questionnaire (see Appendix A) consisted of 50 items grouped in five main clusters describing the IT

teachers: (a) preparation, (b) experience, (c) skills, (d) perceived need for staff development, and (e) general background. The survey statistics varied in reference to the five research questions. The literature and the findings are discussed by research question next.

Research Question 1: To what extent do the CPS IT teachers perceive that they have the preparation and skills to implement the NETS, NSBE, and SCANS competencies for IT students enrolled in CPS IT courses?

This answer addresses the responses to the preparation and skills categories on the survey and will be discussed in that order. The findings indicate that on average more than half (60%) of the responding IT teachers self reported that they feel they are prepared to implement national IT standards as they relate to the nine technology areas. However, their confidence in their personal feelings of preparedness is not at the same level across the nine technology areas. While the IT faculty feel they are well prepared in word processing (90%), they feel least prepared in the areas of CD/ROM multimedia (31%) and HTML/Web page (35%). This difference in level of preparedness to teach the standards to their students raises some concerns about classroom effectiveness and supports the need for professional development activities. David (2005) raises

this warning when he states, "Most people in education believe the future of technology in the nation's classrooms depends on how prepared teachers are to use it . . ."(p. 8). I believe David makes an important point and the teachers in my study demonstrated that they do not feel well prepared in the two areas of CD/ROM multimedia and HTML/Web page. Thus, professional development would be one way to better prepare the faculty in their respective areas of weakness while strengthening the technology classrooms and better preparing the students.

The second category speaks to whether these teachers perceive themselves to have the skills necessary to implement the competencies in their classrooms. The findings show that the CPS teachers' feel comfortable in implementing eight of the nine technology areas. The item with which they feel least comfortable is HTML/Web Page Development (50%).

In this study the Likert scale used offered selections of "moderately comfortable" and "very comfortable" for the participants to choose how developed they perceived their skill levels were in the nine technology categories. In writing the results I combined survey responses of "moderately comfortable" and "very comfortable" and reported that on average 79% of the teachers perceived they

were comfortable in reference to their IT skills. My results mirror the Ascione (2005) survey results concerning teachers' perceived skill level: "Sixty-two percent of teachers surveyed considered themselves at least somewhat advanced users of computers and software applications, and 18 percent considered themselves advanced users" (p.1). Ascione's categories of "at least somewhat advanced," and "advanced users" combined shows a total of 80% of the respondents perceived skill level which is comparable to the 83 percent of CPS teachers who stated skill level comfort. Overall, the study shows that teachers' perceive their skills level category as higher than their skills preparation category.

Several studies listed in the literature (Bozeman 1999a & 1999b; Cradler & Bridgforth, 1997; MacNeil & Delafield, 1998) support the finding that teachers' confidence and leadership in using technology enhances both students' learning and students' appropriate use of technology. I had a similar finding regarding teachers' preparation level, and skills. In the areas that teachers' reported more preparation, there were higher skill levels. Therefore, it would appear that as teachers become better prepared and the more confident and comfortable they become

with their skills, the more likely it is that their students will become successful in their use of technology.

Research Question 2: Does the gender of IT teachers make a difference with respect to preparation, experience, skills, and general background in implementing NETS, NSBE, and SCANS competencies?

My findings indicate that there was no statistically significant difference between males' and females' perception of their preparation and skills levels needed to implement the NETS, NSBE, and SCANS standards competencies. Also, there was no statistically significant difference in males and females regarding their self reported awareness, formal training, and desired training concerning NETS, NSBE, and SCANS standards. However, there was a statistically significant difference between females and males in their IT experience, because the female teachers' had more years teaching experience.

I had assumed entering the study that teachers' just entering the IT teaching profession would have more training and education in IT and, therefore, they would be more skilled. My assumption was shared by a respondent in Irvine and Montgomerie's (2001) study who made the statement that "of course, we expect [new teachers] to be

[more skilled]" (p. 5). The above findings did not confirm this.

Kuschel's (1994) study also found no significant difference between age group and or gender concerning computer attitude and literacy variables. In Kuschel's study the males' and females' perception of their preparation and skills levels did not indicate any difference between the genders. My study found a statistically significant difference in experience because female teachers in general had taught longer than male teachers.

Research Question 3: Is there a relationship between IT teachers' total years of teaching experience and their perception of their preparation and skills in implementing NETS, NSBE, and SCANS competencies?

The finding indicates that there were no significant correlations between the number of years taught in relation to teachers' preparation, skills, and staff development or in predicting teachers overall perception of skills for implementing skill standards competencies. I assumed the younger or newer teachers would feel more prepared in using and teaching technology standards. My assumption was shared by Lonergan (2001) who stated: "Almost two-thirds . . . younger teachers, who grew up with computers and were

educated with them, indicated they felt better prepared to use technology than their more experienced colleagues" (p. 2).

My findings indicate that for the variable, Years taught, the highest percentage of the respondents were new teachers in terms of years of overall teaching. However, the findings indicate we cannot predict from knowing teachers' years of teaching whether their perceived preparation, and skills make them capable of implementing skill standards competencies.

Research Question 4: Is there a relationship between years of IT teaching experience and teachers' perception of their preparation and skills in implementing NETS, NSBE, and SCANS competencies?

The finding indicates that there were no significant correlations between years taught and IT preparation; skills, and needed staff development as they relate to implementing skill standards competencies. Newman (2000), Gordon (2003), and Kotrilk, Harrison, and Redmann (2000) stress the need for current review and training as technology software, training techniques, curriculum, and instruction are rapidly changing. Therefore, because a teacher was current or an advanced user in the latest software in 2000 does not make that same teacher an

effective technology teacher in 2005. The rapid change of technology is a reality that can be addressed through staff development. Overall, the information technology years taught was no indication of preparation and skills in implementing current skill standards competencies.

Research Question 5: What professional development training do the CPS IT teachers identify as being desirable to enable them to become more ready to implement the NETS, NSBE, and SCANS competencies?

The findings indicate that on average approximately 60% of the teachers stated they are prepared to implement NETS, NSBE, and SCANS competencies. As teachers become aware of skill standards competencies, they are more willing to implement them (Parker, 1998). Absence of recent training the CPS IT survey (40.4%) indicates correspondence to Ascione (2005) survey, "Thirty-one percent of teachers surveyed said they received no technology training from their schools in the last 12 months, and 42 percent said they received eight hours of training or less" (p. 37). While my study found that 47% of the respondents had taken an IT refresher course within the last year and 30% more had taken a refresher IT course within the last three year, I did not clarify whether it was a course CPS had offered or they had taken on their own. In support of this study

Irvine and Montgomerie (2001) state, "To preserve financial investments in technology infrastructure and to prepare students for the new economy of the 21st century, school administrators must look to teachers training and technology standards" (p. 7). Offering current software versions, and skill standards competencies to IT teachers is essential in providing quality technology education. My results indicate that CPS teachers' value training that would enhance IT delivery and students' outcomes.

Staff Development Requests and Implications

Based on the respondents' requests for staff development and their recorded comments, the following implications emerged. First, the definition of staff/professional development in the technological age must be expanded to include formal and informal learning experiences as Grant (n.d.) stated:

Professional development . . . goes beyond the term 'training' with its implications of learning skills, and encompasses a definition that includes formal and informal means of helping teachers not only learn new skills but also develop new insights into pedagogy and their own practice, and explore new or advance understandings of content and resources. [This] definition of professional

development includes support for teachers as they encounter the challenges that come with putting into practice their evolving understandings about the use of technology to support inquiry-based learning . . . Current technologies offer resources to meet these challenges and provide teachers with a cluster of supports that help them continue to grow in their professional skills, understandings, and interests. (p. 1)

Staff development and professional development are used interchangeably. This study aided in the development of IT teachers' training by identifying types and levels of training they needed. The training is crucial for IT teachers to be able to impart current IT industry trends, applications, and skill standards competencies to IT students. Concerning education reform, Gordon (2003) stated:

The movement called for greatly improved academics, to be achieved primarily through increased education standards and accountability (both teacher and student) . . . Quality programs depend on qualified educators with access to continuous professional development activities, state-of-the-art technology, and student support services; equity in access to programs; integrated academic and occupational curricula based on industry approved standards. (p. 103)

Some respondents' requested integration of reading, projects, standard based-learning activities as well as curriculum that address these concerns. McKenzie (1999) stressed that integration of technology is critical in staff development to demonstrate true student achievement outcomes (p.1). The importance of keeping teachers' current with IT industry trends, and technology is essential to developing students' technology skill standards. It provides teachers with the ability to learn new strategies and techniques that will improve students' technology skills. Overall this should improve students' achievement and outcomes.

In order to assess the importance of professional development programs to the district, its teachers and ultimately its students, the National Staff Development Council (1995) stated that, "evaluation must be seen as an ongoing process that is initiated in the earliest stages of program planning and continued beyond program completion" (p. 7). Once the findings are discovered they should be communicated clearly to establish effective professional development training as this study attempted to do.

The respondents' comments concerning enhancing classroom training for students are supported by Speck's (1996) belief that the ultimate goal of staff development

is to improve student learning. This is also supported by Darling-Hammond and Berry's (1998) statement that, "Teacher quality is the factor that matters most for student learning" (p. 1), meaning that teachers' value increased student achievement as an outcome of professional development. All staff development should enhance the curriculum for which the teacher is responsible.

The respondents' comments about computer technology techniques change and more training is needed for longer periods of time are supported by Speck's (1996) statement that "professional development takes time and must be conducted over several years for significant change in educational practices to take place" (p. 35). Sufficient time, follow-up support for teachers to master new content and strategies, and assistance integrating them into their practice are all necessary for an effective staff development program (Corcoran, 1995, p.1). The researcher believes it is especially needed in technology programs. The technology staff development should be the same as the technology used in the classroom.

Recommendations for Future Studies

The following recommendations are offered for consideration for future research:

1. Have research studies implemented more frequently for IT (information processing) teachers. This would ensure that staff development requests are current and reflect the immediate needs of current classroom IT teachers.
2. Survey other IT programs' staff development needs in the areas of computer programming and Business System Networking Telecommunications. This would identify staff development requests for the other IT teachers.
3. Survey technology coordinators at the secondary schools concerning their ability to train others in the use of technology applications. Some technology coordinators are not certified teachers and do not have teaching techniques and strategies. This survey would identify the technology coordinators who would need training in instructional processes.
4. School districts need to survey student outcomes as they relate to workplace competencies.

Recommendations for Practitioners in the Field

The following recommendations are offered for practitioners in the field of technology education:

1. Provide incentives to ensure that IT teachers' pursue regular staff/professional develop to stay current in the IT industry applications and tends, so they will be prepared to teach current software applications and computer competencies.
2. Implement systematic surveys identifying needed staff development on a regular basis and acquire the budget to support such staff development.
3. Offer new IT teachers an orientation on technology skill standards competencies, and update all IT teachers on software applications.

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APPENDIX A

INFORMATION TECHNOLOGY TEACHERS' SURVEY

Directions: Please indicate your answers below in the appropriate spaces. If a question gives you a selection of choices, please put an X in the box under the number that corresponds to the most suitable answer.

IT Preparation					
Identify the amount of training you *have received* in each of the following areas.					
4 = extensive 3 = quite a bit 2 = some 1 = minimal 0 = none	**4**	**3**	**2**	**1**	**0**
1. Advanced Input/Output Devices					
2. Word Processing					
3. Databases					
4. Spreadsheets					
5. Desktop Publishing					
6. Internet software (e.g., Netscape)					
7. Basic Operating System Techniques					
8. CD-ROM/Multimedia Applications					
9. HTML/Web Page Development					
10. Have you taken any other formal IT training courses? (Circle one)	Yes			No	
11. If so, what type of IT courses have you taken?					

IT Experience		
12. How many years have you taught IT subjects?		
13. Are you Microsoft Office Specialist (MOS) certified? (Circle one)	Yes	No
14. If your answer to 13 was "Yes," in which MOS area are you certified? (Circle ***all*** that apply.)	Word	Excel
	Outlook	Access
	PowerPoint	
15. How many refresher IT courses have you taken?		
16. What is the last month and year that you took a refresher IT course?		

IT Skills					
Comfort: 4 = very comfortable 3 = moderately comfortable 2 = would need some help to feel comfortable, and 1 = would need a lot of help to feel comfortable	**4**	**3**	**2**	**1**	
17. Advanced Input/Output Devices					
18. Word Processing					
19. Databases					
20. Spreadsheets					
21. Desktop Publishing					
22. Internet software (e.g.,Netscape)					
23. Basic Operating System Techniques					
24. CD-ROM/Multimedia Applications					
25. HTML/Web Page Development					

-Please turn over-

IT Staff Development					
Identify the amount of training you feel you *need* in each of the following areas					
4 = extensive 3 = quite a bit 2 = some 1 = minimal 0 = none	**4**	**3**	**2**	**1**	**0**
26. Advanced Input/Output Devices					
27. Word Processing					
28. Databases					
29. Spreadsheets					
30. Desktop Publishing					
31. Internet software (e.g., Netscape)					
32. Basic Operating System Techniques					
33. CD-ROM/Multimedia Applications					
34. HTML/Web Page Development					
35. Please describe any other aspects of staff development which would enhance your IT teaching that you would like to be addressed.					

General Background		
36. As of the end of this school year, how many years will you have taught in any subject area?		
37. How many IT courses do you teach per day?		
38. Do you teach courses other than IT courses? (Circle One)	Yes	No
39. What other subject areas do you teach?		
40. What is your gender? (Circle One)	Male	Female
41. Are you aware of the National Technology Educational Standards (NETS)? (Circle One)	Yes	No
42. If you replied "Yes" to number 41, have you been formally trained on the NETS? (Circle One)	Yes	No
43. Are you aware of the National Standards of Business Education (NSBE)? (Circle One)	Yes	No
44. If you replied "Yes" to number 43, have you been formally trained on the NSBE? (Circle One)	Yes	No
45. Are you aware of the Secretary's Commission on Achieving Necessary Skills (SCANS)? (Circle One)	Yes	No
46. If you replied "Yes" to number 45, have you been formally trained on the SCANS? (Circle One)	Yes	No
47. Would you like to have formal training on the NETS? (Circle One)	Yes	No
48. Would you like to have formal training on the NSBE? (Circle One)	Yes	No
49. Would you like to have formal training on the SCANS? (Circle One)	Yes	No
50. Comments:		

Return to: CPS – MR 125
Department of Education to Careers – 12th Floor
Linda B. Walton-Todd

APPENDIX B

SURVEY LETTER

Colorado State University

Knowledge to Go Places

School of Education
1588 Campus Delivery
Fort Collins, Colorado 80523-1588

Date: April 6, 2005

Subject: Technology Competency Survey

Dear: Information Technology Teachers

As a PhD student at Colorado State University and under the supervision of advisor Dr. Timothy Davies, Linda is doing dissertation research on a study to determine the needs of Chicago Public Schools (CPS) Education to Careers (ETC) Information Technology (IT) teachers with respect to the National Education Technology Standards; The dissertation is entitled Information Technology Teachers' Perception of Implementing the National Education Technology Standards. As you may know, the International Society for Technology in Education (ISTE), National Business Education Association (NBEA), and the Secretary's Commission on Achieving Necessary Skills (SCANS) established computer competencies for all students and teachers. In an attempt to determine CPS IT teachers' readiness to implement the national computer competencies, I am requesting your input on the enclosed questionnaire. It will take approximately 15 minutes. By completing and returning the attached questionnaire, you are giving your consent to participate in this study. Please return questionnaire via the CPS mail in the enclosed self-addressed envelope by April 26th. Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at anytime without penalty or loss of benefits to which you are otherwise entitled.

However, participating in this survey will help CPS/ETC plan effective staff development, and improved instruction in the use and delivery of computer technology for IT teachers and students. Your response will be anonymous. No names will be collected and the code on the envelopes will only be used to make a second contact. The code and data will be kept separately; the researcher won't have the code key. It will be keep by the ETC clerk. A reminder letter will be sent if your response is not received by April 26th.

You may contact me at 773-553-2460 or by e-mail at lbwalton-todd@cps.k12.il.us. Thank you for your time and cooperation on this important matter. If you have any questions about your rights as a volunteer in this research, contact Celia Walker, Director of Regulatory Compliance, at 970-491-1553.

Sincerely,

Timothy Davies, PhD
Colorado State University
School of Education
100 Education Building
Fort Collins, CO 80523-1588

Linda B. Walton-Todd
Chicago Public Schools
125 South Clark Street
12th Floor - ETC
Chicago, IL 60603

APPENDIX C

REMINDER SURVEY LETTER

Colorado State University

Knowledge to Go Places

School of Education
1586 Campus Delivery
Fort Collins, Colorado 80523-1586

Date: April 26, 2005

Subject: Technology Competency Survey

Dear: Information Technology Teachers

As a PhD student at Colorado State University and under the supervision of advisor Dr. Timothy Davies, Linda is doing dissertation research on a study to determine the needs of Chicago Public Schools (CPS) Education to Careers (ETC) Information Technology (IT) teachers with respect to the National Education Technology Standards. The dissertation is entitled Information Technology Teachers' Perception of Implementing the National Education Technology Standards. Approximately two weeks ago I sent you a questionnaire concerning the needs of CPS/ETC IT teachers with respect to computer technology. I have yet to receive your completed and returned questionnaire.

With the semester already in full swing, I realize that you are extremely busy. I request that you take approximately ten to fifteen minutes of your valuable time to complete the questionnaire and return it by May 11th, in the CPS mail self-addressed envelope. In case you have misplaced the questionnaire, I have enclosed another copy. If you have any questions, please call Linda Walton-Todd at (773) 553-2460 or e-mail lbwalton-todd@cps.k12.il.us.

Your help in completing the questionnaire is very much appreciated. Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled. Thanks again for your time and cooperation on this important matter. If you have any questions about your rights as a volunteer in this research, contact Celia Walker, Director of Regulatory Compliance, at 970-491-1553.

Sincerely,

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