Determining Staff Development Needs to Achieve Computer Technology Competence by Instructional Personnel in Gloucester County Public Schools

by

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Dissertation submitted to the Faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

in

Educational Leadership and Policy Studies

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October 22, 1997

Blacksburg, Virginia

Key Words: Computer, Competency, Teacher, Staff Development

DETERMINING STAFF DEVELOPMENT NEEDS TO ACHIEVE COMPUTER TECHNOLOGY COMPETENCE BY INSTRUCTIONAL PERSONNEL IN GLOUCESTER COUNTY PUBLIC SCHOOLS

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(ABSTRACT)

The Virginia Board of Education is considering the adoption of technology standards for instructional personnel in Virginia's schools. All pre-service instructional personnel will have to demonstrate proficiency prior to obtaining a Virginia teaching certificate. Those currently in service may also have to demonstrate proficiency, as defined by the local school division.

This study was designed to be a prototypic model for implementing the standards in Gloucester County Schools. Three hundred-ninety (390) instructional personnel were surveyed, according to selected strata, regarding their current level of competence. The discrepancy between the current level of proficiency and the level required by the standard defined the need for staff development. Differences among strata were provided for in planning for staff development activities.

Staff Development activities were planned for all identified needs and implemented for a pilot group. The training sessions focused on raising the level of proficiency to that required to satisfy the standards. Participants in the pilot group were re-surveyed to verify the plan. An assessment procedure for measuring and reporting mastery on the standards was proposed by the pilot group.

The process outlined in this study will be condensed into a brochure that will be provided to the Virginia Department of Education for possible distribution to other school divisions.

Dedication

This dissertation is dedicated to the instructional staff of Gloucester County Public Schools and to my mother, Naomi G. Hoover, whose unqualified love has inspired all of my accomplishments.

Acknowledgments

The completion of this study would not have been possible without the support and assistance of many individuals. I am especially indebted to my advisor, Dr. David Parks. His encouragement kept me on task and his commitment to excellence is evident in the result. I am, also, grateful to Dr. David Alexander, Dr. Glen Earthman, Dr. Bob Richards, and Dr. Ida Hill for their assistance throughout the process.

The Gloucester County School Board is appreciated for pressing the pursuit of the degree and for financially supporting the effort. Their high expectations, along with similar urging from my parents, provided the necessary motivation.

Members of the Action Committee worked diligently with the study for a full school year. Under the able leadership of Joe Snare, Technology Specialist, representatives from the instructional staff guided the study. Their participation was critical to its successful completion.

Finally, a special thanks goes out to all the instructional staff in Gloucester County Public Schools for their willing participation in the study. Their efforts have resulted in a prototypic model for acquiring and certifying proficiency with instructional technology.

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CHAPTER I

DESCRIPTION OF THE STUDY

Introduction

A decision on technology standards for instructional personnel is expected during this school year from the Virginia Board of education. The implementation of the standards will be the responsibility of each local school division.

This study is a prototypic model of how a school division could approach the challenge. Instructional personnel self- assessed their current level of competence on each of the standards. From the results of the self-assessment staff-development activities were planned and conducted with a pilot group. An expected level of competence was decided for each of the standards that was based on the availability of the required technology. An assessment procedure for determining competence by instructional personnel concluded the model.

Context of the Study

During the development of the current Six-Year Educational Technology Plan For Virginia (Virginia Department of Education, 1996), the thirty-one member Virginia Educational Technology Advisory Committee (VETAC) continued wrestling with the need for staff development and the addition of personnel to support the technology already in use in Virginia's public schools. Recommendation 10 of the plan reads, "Promote specialized training for the technology designee in each school and conduct a study of guidelines for technology competencies and endorsement requirements" (1996, p. 28). To achieve the recommendation, VETAC urged the state to join with local school divisions in recommending the employment of technology specialists in proportion to the technology in place in the schools.

Recommendation 11 added, “Promote training and professional development on available technologies and software for school personnel across all levels and positions” (Virginia Department of Education, 1996, p. 29). The plain fact is that the purchase and distribution of computer hardware and software outpaced the employment of personnel needed to support the technology and to adequately train existing staff in its use.

As an example, a 1990 statewide survey in the California public schools determined the order of priorities for funding instructional technology to be computer equipment, computer software, facilities improvements, and then staff development, with no mention of the addition of support staff. Of a total $10,247,376 budgeted for educational technology, only $681,656 was designated for staff development (Main & Roberts, 1990, p. 16). The purchase of new equipment, instead of funding staff development, was affirmed by Ted Hasselbring (1991) in an often cited article. In 1992, Lynn Olson, the senior editor of Education Week, wrote, “The rush to buy equipment has, in many respects, outpaced careful thinking about its use” (p. 20). Olson concluded that little changed since the widespread use of computers began in schools during the 1980’s. The high cost of purchasing, lack of appropriate software, absence of assessments, and the dearth of staff development remain as obstacles.

A recognition of the need for staff development may be emerging. Betty Caster, Florida’s Commissioner of Education, reported in an October, 1993, interview for Electronic Learning that a full 30% of a $55 million appropriation for educational technology in Florida had to be used for training. In the same issue, Electronic Learning reported that 38% of school districts plan to increase hardware spending, 43% will increase software spending, and 34% plan to spend more on staff development (Bruder, 1993), as evidenced from a technology survey conducted by Willard & Shullman, Greenwich, Connecticut.

The need for staff development to ensure the full utilization of existing technology is a reoccurring theme in the literature; however, the addition of specialized personnel to support that use is seldom mentioned. In a paper prepared by staff at the Virginia Department of

Education (1996) entitled, Responses to Six-Year Educational Technology Plan for Virginia, higher education leaders called attention to the concern that personnel needs are underestimated and that building level technology designees may not be sufficient to support the needs of teachers.

The Committee on Research and Information of the American Association of Colleges for Teacher Education (AACTE) surveyed faculty and students in teacher education programs through the Research About Teacher Education (RATE) Project in the mid-1980's. In Teaching Teachers: Facts and Figures (American Association of Colleges for Teacher Education, 1987), the early and often referenced project included an analysis of responses to the perceptions of readiness for teaching by both faculty and students. Fifty-eight percent of faculty and only twenty-nine percent of students felt ready to teach with computers. These were the lowest percentages citing readiness of all the facets of teaching addressed in the survey. In 1989, International Business Machines (IBM) commissioned the Wirthlin Group, a marketing firm, to conduct a national survey of teachers about their attitudes toward the use of computers in the classroom. Among the results were the following:

- More than half (59%) of all teachers polled agreed that most teachers who were using computers for instruction were inadequately trained in their use,
- More than half (52%) of all teachers interviewed felt that their students were more computer literate than they themselves were, and
- Thirty-eight percent (38%) of teachers polled said that inadequate computer training and lack of computer experience among teachers was one of the greatest obstacles to more
  effective use of computers for instruction (Wirthlin Group, 1989, p. 35).

Although these studies are now dated, they are frequently referenced in the literature because they were nation-wide surveys, utilizing large samples of respondents. The results continue to be significant because teacher conditions have not changed appreciably, as reported in several subsequent surveys.

A 1990 study of elementary education majors at SUNY College at Buffalo showed a continuing absence of adequate development in computer skills. More than half (54%) had never used a computer in any college course, and more than half (53%) rated their ability to use a computer as low or nonexistent (Beaver, 1990, p.4).

A national study of 500 universities undertaken in 1989-1990 was designed to determine the inclusion of computer training in courses for educational administrators. The results indicated that only 2% of the colleges surveyed reported that they provided regular courses for their trainees, 14% reported that training was provided by another department, and the remaining offered no courses (Morton, 1996).

The results of the most recent survey conducted by the Office of Technology Assessment (1995) for the U. S. Congress yielded the following key findings:

- A majority of teachers reported feeling insufficiently trained to adequately use computer technology resources,
- A majority of schools lacked an on-site person assigned to coordinate or assist with the use of technologies,
- Teachers reported that they needed more than training. They wanted hands-on opportunities, access to support personnel, and convenient access to equipment, and
- Lessons learned from successful sites suggest that those willing to invest in technology should plan to invest substantially in skilled personnel as well.

In an included survey, Ronald Anderson determined that less than half of America's schools reported that an introductory computer course was available in either the school district or at a local college (as cited in Office of Technology Assessment, 1995).

During this same time period, the Virginia Board of Education initiated the development of a K-12 educational technology plan. An advisory committee organized to

develop the Six-Year Technology Plan for Virginia (Virginia Department of Education, 1989) to cover the period 1988-1994. Following the development of that plan, State initiatives funded the distribution of more than 10,000 computers (with appropriate software) to support the instruction of students in grades 5-8, who were believed to be at risk of failing the Literacy Passport Test.

With the Standards of Quality for Public Schools in 1992 calling for local school biennial plans containing a technology component, school divisions identified local resources that were available to expand technology purchases. The earlier committee was reorganized as the Virginia Educational Technology Advisory Committee (VETAC) and was charged with the development of a new technology plan for public schools designed to follow-up the original plan that expired in 1994. During the first biennium of the new plan (1994-1996), state emphasis shifted to equipment for library automation and networking available equipment (Virginia Department of Education, 1996).

All schools received state funds to fully automate library operations and to begin retrofitting their buildings to include wiring for networks. In the current biennium (1996-1998), the state will provide additional funds for the continuation of infrastructure upgrades and the acquisition of additional equipment to support the new instructional technology standards in the Standards of Learning (Virginia Department of Education, 1995). Although the emphasis continues to be the acquisition of equipment and improvements to building infrastructure, staff development is a component of the small required local match. No provision exists for the addition of needed support personnel.

In anticipation of the need to support the instructional technology requirements of the new Standards of Learning, representatives of the VETAC committee worked with the Advisory Board on Teacher Education and Licensure (ABTEL) to identify minimum technology standards for instructional personnel in Virginia (Advisory Board on Teacher Education and Licensure, 1996). In the future, instructional personnel throughout the

Commonwealth of Virginia will be required to meet these standards. Further, all instructional personnel seeking initial certification (licensure) or re-certification in Virginia may be required to demonstrate (to the local school division) proficiency on all of the adopted technology standards.

The efforts of the task force produced a comprehensive report that defined eight (8) standards and a detailed listing of competencies to be used at both the pre- and in-service levels (see Appendix A to review the standards and competencies).

The Problem

For more than a decade now, microcomputers have been the basis for technology instruction in Virginia. The infusion of state funds, beginning in 1988, along with massive local efforts resulted in an average state-wide ratio of one (1) computer to every 10.5 students by 1995 (Virginia Department of Education, 1996). Because computer equipment has been purchased using funds raised through the sale of bonds by the Virginia Public School Authority (VPSA), which are backed by Literary Fund earnings, only capital expenditures have been allowed. Funds from other sources have been limited to support staff development, and none have been available to provide needed staffing. Bond revenues can only be used for capital (building and major equipment) needs. Numerous researchers have concluded that while computer equipment has been added, little or no training for those intended to use the equipment has been provided.

The Virginia Board of Education is expected to adopt minimum instructional technology standards during the coming year (1998). All of Virginia's instructional personnel will be expected to demonstrate proficiency for initial licensing (pre-service) and may also be expected to do so at the time of the first renewal of their license (in-service).

To date, there has been no assessment of the current level of proficiency among instructional personnel and no provisions for the staff development of personnel. Is there an assumption that the proficiency level of instructional personnel already meets the adopted standards without additional staff development? If not, what will be the need(s) and how will it (they) be addressed?

A question for state and local education officials is, how can the state and local school divisions provide for this needed development of faculty and staff? In this study a prototypic process for assessing the current level of technology proficiency of instructional personnel in a moderate size school division will be designed, and a staff development program will be created and piloted to overcome deficiencies. The process will be condensed and communicated to other school divisions so that it can serve as a prototype.

Significance

This study enabled staff in a Virginia school division to identify the need for staff development to elevate the current level of technology proficiency to that required by the state's standards for instructional personnel. With the great infusion of computer hardware and software in all schools, no assessment had been conducted to determine the proficiency level of instructional personnel utilizing the equipment. After the staff development needs were identified, activities were designed to address those needs. By analyzing the data according to selected strata of personnel, the training was tailored to small group needs. A schedule of training activities was developed that prioritized personnel participation. Applying this prototypic approach to the assessed needs of instructional personnel in Gloucester County Public schools resulted in the identification of appropriate staff development that was piloted with a group of instructional personnel prior to full implementation, with mastery of the technology standards as the goal. The Virginia Department of Education and other local school divisions can use this study as a model in the development of policies needed to bring about

full implementation of the new technology regulations. The challenge this problem presents to colleges of education for pre-service preparation was not addressed in this study.

To date, planning underestimated the requirements for the human resources and training necessary to fully utilize the instructional technology already in place. Because the role of technology in schools is sure to increase in the 21st century, the need for qualified, trained technicians and educators will become more dramatic.

Methodology

Participatory action research best describes the methodology of this study. Action research is a classification of research originating after World War II. The term was first used by Kurt Lewin in the mid-1940's (Cunningham, 1953). It was designed to solve problems in the setting of the problem. It encouraged the researcher to experience the problem as the solutions evolved, and the participants were expected to assist with the determination of solutions. Its usefulness in research is determined by the degree to which results are applicable to solving practical problems and contributing to the welfare of an organization.

The term, "participant," was introduced by Cunningham (1953), as one of four types of action research: diagnostic, participant, empirical, and experimental. After a dormant period as a research technique, it has enjoyed a resurgence with work done by Oja and Smulyan (1989), who introduced a new phrase, collaborative action research. As applied to educational settings, it suggests that each group affected in the process share in the planning, implementation, and analysis of the research; and that each participant contributes differing expertise and a unique perspective. Others have contributed to the resurgence as well (Calhoun, 1994; Stringer, 1996; Whyte, 1991). The recurring theme is that action research is a cycle consisting of identifying a problem, collecting and organizing the data, analyzing and interpreting the data, determining and applying the intervention, assessing the results, and starting over, if necessary. Critical to this process is the participation of representatives of those affected by the problem.

The utilization of this research technique is detailed in work done by William Foote Whyte (1991). The term “participatory” is reintroduced in a research technique referred to as participatory action research (PAR). PAR evolves from earlier work by several researchers.

The pioneering work by Mary Parker Follett (1926) contrasted the conflict between management and labor. She advocated coming around the table to talk out problems. Such a participatory leadership style was designed to facilitate better relations between employee and employer. The motivational research conducted by Abraham H. Maslow (1943) resulted in the defining of five (5) basic needs that he arranged in a “hierarchy of prepotency.” The degrees to which these basic needs were satisfied dictated individuals’ productivity in the workplace. The personality and organizational theory developed by Chris Argyis (1970) applied Maslow’s work to organizations. Within the formal structure of any organization, people have needs that must be met in order to avoid conflict. The objective should be to merge the goals of the organization with the needs of the employees.

These efforts resulted in organizational theory that integrated the rigid structure of organizations with the human needs of the workers. Likert (1967) pulled the research of the day together and defined the characteristics of participatory management in “modern” terms. Site-based decision-making decentralizes authority, involves personnel, increases accountability, and takes advantage of human capital. Working through this same time period, W. Edwards Deming had come to the same conclusions, gained acceptance in Japan, but had been generally ignored in America (Walton, 1986). His discovery in this country, late in his life, had a dramatic impact on American business through what has become known as Total Quality Management (TQM), a terminology that Deming never used. Deming preached shared decision making and continuous progress.

Participatory Action Research (PAR), using an action committee (AC) of participants as the basis of the methodology, characterizes this study. Worker participation in the study is considered critically important to its success.

Action Committee

To assist with defining the problem and designing a strategy to address it, a committee comprised of technology-proficient participants was established that was representative of affected instructional personnel. The committee membership included one person, identified by the principal as being highly proficient with instructional technology, from each of the eight schools; one special education teacher from the high school; one non-teaching, certificated person with a high degree of skills; the division's network specialist; and the researcher. The network specialist served as chairman of the twelve member committee, and a recorder was selected from the membership.

The researcher participated in the work of the committee by:

- Serving as a resource of information and ensuring that members had access to all relevant research done in relation to the problem,
- Charging the committee with the tasks to be completed,
- Guiding the committee by providing examples, models, and suggestions,
- Maintaining the committee's schedule of meetings and facilitating communications with and among committee members,
- Prompting the chairman, who served as facilitator of the meetings,
- Reporting the results of the committee's efforts, and
- Facilitating all aspects of the study until its completion.

After organizing, the Action Committee was immediately charged with making a number of decisions that were prerequisite to the study. These were:

Assessing the technology competence of school division personnel.

- Determining best means of assessing current proficiency,

- Creating a list of “indicators” for each of the eight standards that provided a measure of instructional personnel’s proficiency,
- Incorporating the indicators into an assessment instrument,
- Determining and selecting the sample of participants to be assessed,
- Determining the strata to be assessed and analyzed,
- Determining what constitutes proficiency on the Virginia technology standards for personnel,
- Contrasting the current level of proficiency of participants with the proficiency levels determined by the Action Committee,
- Conducting the assessment, and
- Analyzing the assessment results.

Previous research was of little assistance to the Action Committee in assessing the current technology competence of in-service personnel. By far, the greatest amount of data has been gathered on the computer proficiency of students (Brown & Kester, 1993; Bruder, 1993; Office of Technology Assessment, 1995a; TQM Team Report, 1993). To a lesser extent, some research has been concluded on higher education faculty and pre-service education students. Moursund (1989) wrote, “By and large our colleges of education are doing a miserable job of preparing teachers to deal with the Information Age” (p.52). A similar alarm was sounded by Bruder (1989) who concluded that schools of education placed obstacles to undergraduate pre-service technology training. So little time exists for undergraduate students to participate in specialized programs and, therefore, time represents an obstacle. Teacher education faculty are often slow to use computers themselves and that can be the biggest obstacle to training future teachers.

Using computers in instruction has been reported as the weakest facet of teaching listed by pre-service education students (American Association of Colleges for Teacher Education, 1987; Beaver, 1990). Barger and Armel (1992) point to the slowness of teacher education

faculty in learning the technology themselves and even slower in including it in their instruction.

A study conducted during the spring of 1995 contained a survey of the computer use of limited-computer-knowledge teachers (Larner & Timberlake, 1995). In preparation for their study, the researchers found no research having been completed in the assessment of computer proficiency by in-service teachers. Only surveys of use (Wirthlin Group, 1989) and teacher attitudes and anxieties (Cobbs, 1990; Davidson & Ritchie, 1994) were cited. The same result was experienced in preparation for this study.

Developing a staff-development program for integrating technology (voice, video, and data) into the classroom.

- Translating the needs, determined from the survey results, into a staff-development program that addresses the needs,
- Planning a staff-development schedule to address the needs of all personnel,
- Determining the staff-development delivery system, and
- Arranging for the conduct of staff-development sessions.

Much of the burden for technology staff development of instructional personnel on computing skills is placed on colleges of education and their pre-service training. Critics of the training focus on three areas. First, college teachers do not adequately model appropriate use of computers. Second, designers of teacher education programs do not incorporate technology into their curriculum. Third, instructors who teach pre-service teachers stress older and simpler instructional applications of computer technology and less with newer, more sophisticated tools, which require higher-order thinking and problem solving skills (Abdal-Haqq, 1996).

College courses designed for pre-service teachers may not be sufficient. Responses to a survey of 133 education graduates showed that equal attention should be given to “hands on” and “minds on” opportunities in the methods courses and in student teaching activities

(Handler, 1993). It is important that future teachers work with technology and see their professors use what they will be expected to do in their own future classrooms. Curriculum design should focus on certain basic skills. Students develop skills related to four areas of computer use: computer literacy, integrated software applications, teaching with computers, and content area software (Andris, Keefe, & Nelson, 1990). Instruction should progress from general computer skills in introductory courses to discipline-specific techniques and software taught in methods classes to application of skills in student teaching.

Planning for staff development designed for teachers who are in service can benefit from the work done in the colleges of education with pre-service teachers. Patricia Sturdivant (1989) lists the following obstacles to effective teacher training for in-service teachers that have to be overcome:

- Incentives are lacking for training,
- Teachers who take additional training are often unrecognized and lack peer recognition for their extra efforts,
- Teachers are already overburdened with paperwork, which leaves little time for staff development,
- Teachers have limited opportunities to see model applications,
- Teachers are isolated and have few opportunities for sharing,
- Access to software is limited,
- Teachers still don't have enough computer access,
- Teachers don't get enough coaching, advice, and assistance,
- Feedback and direction are often missing, and
- Teachers can't provide quality training sessions for their peers because they have so little time to prepare. (p. 32-33)

One of the obstacles the Action Committee in Gloucester County can overcome deals with incentives to staff development. Stout (1996) highlighted the following practices that are in place around the country: salary enhancement, certificate maintenance, career mobility, and

enhancing classroom performance as motivators to get teachers to participate in training. A school district in California promised participants a computer workstation after they completed 40 hours of summer training (Williams & Smith, 1994). In Illinois a school district instituted a loan and buy program. It lets participants make a one-time purchase of a computer using an interest-free payroll deduction over a twenty-four (24) month period. Participants can be reimbursed for the entire amount (up to $2000) by exercising staff development choices: For every fifteen (15) hours of training, a $200 credit on the loan can be earned (Moffitt, Friesema, & Brady, 1994).

In Hull, Massachusetts, the district identifies lead teachers willing to participate in training and provides them with equipment and software. These lead teachers then train and assist others (Orwig, 1994).

In Lake Washington, Washington, every new teacher is given an Apple computer at the beginning of the school year. Two weeks of summer training are required. Additional training is advertised through coupon books. Teachers sign up for the free voluntary classes by remitting appropriate coupons (Gursky, 1991).

David Hurst (1994) reported that teachers that he talked with felt in-service training in technology had been positive, but too short and infrequent. They wanted more than the usual single-shot class. They wanted to be involved in the planning. In addition, access to the technology in a non-threatening environment was a reoccurring theme. The desired solution may be a small room dedicated to continuous technology inservice in each school.

<u>Reassessing proficiency.</u>

- Designing a scheme for measuring mastery, as defined by the Action Committee, and
- Providing a scheme that is expandable from the sample to all instructional personnel.

Reporting mastery.

- Designing a system for reporting mastery of the technology standards by instructional personnel.

Sample

Although there are more than four-hundred instructional personnel in the school division, The Action Committee decided to survey all instructional personnel. The following grouping for selecting a stratified sample was adopted by the Action Committee:

1. K-2 Regular Primary Teachers,
2. 3-5 Regular Elementary Teachers,
3. K-8 Resource Teachers,
4. K-12 Special Education Teachers,
5. 6-8 Regular Middle School Teachers,
6. High School English or Social Studies Teachers,
7. High School Math or Science Teachers,
8. Fine Arts or Vocational Teachers,
9. Other High School Teachers, and
10. Non-Teaching Instructional Staff.

Research Questions, Data Collection, and Data Analysis

This section is organized into (a) the identification of the research questions raised by the problem, (b) the method(s) of data collection necessary to address the research question, and (c) the intended analysis of the data. Each research question is immediately followed by relevant subquestions.

Research Question One: Assessing the Needs

What is the difference between the current level of proficiency with technology, as self assessed by instructional personnel, and that required by the standards expected to be established by the Virginia Board of Education?

Subquestions

A. Which technology standards will require additional training?
B. Which technology standards, if any, will not require additional training?
C. What are the differences in technology proficiency of instructional personnel among selected groups?

Data collection.

Participants were canvassed, according to ten different groups, using an assessment designed by the Action Committee that enabled the participants to self-evaluate their perceived proficiency in the knowledge and skills the Action Committee decided were addressed by the standards. In designing a survey component, as the assessment instrument, the Action Committee chose qualitative responses, words rather than numbers (Miles & Huberman, 1987).

The Action Committee was been presented with two model surveys. One was used at the University of Wisconsin (TQM Team Report, 1993) to evaluate the computer competencies among UW-STOUT students (see Appendix B for a copy of the survey). On this survey, the competencies were grouped into seven categories: basic computer skills, word processing skills, spreadsheet skills, database skills, graphic and multimedia skills, information retrieval and telecommunications skills, and programming skills. Forty-four “indicators” (survey items) were employed to measure the competence levels. For each “indicator” the respondent was requested to indicate “yes,” “no,” or “unsure” for whether they could perform

the task. The results were displayed using a number of tables contrasting respondents on each competency. Although the competencies are different from those addressed in this study, the format was useful, as a model.

A second survey was provided that has been used in Henrico County (1996) to assess computer proficiency skills and to determine the need for training. On this survey the respondent answered: (a) nonuser, (b) beginner, (c) intermediate, or (d) expert to the types of computer applications (see Appendix C for a copy of the survey). A survey instrument was chosen because this study is intended to be a prototype, useable in all school divisions.

A survey for assessing proficiency raises questions of validity, or the instrument's ability to measure what it sets out to measure. The Action Committee addressed both face and content validity. Face validity can be addressed by a cursory review of items by untrained judges (Litwin, 1995). A test of content validity requires the addition of a set of reviewers who have knowledge of the subject matter (Litwin). The Action Committee can serve in both capacities, as untrained judges and as the most knowledgeable people on instructional technology in the school division. In addition, members of the researcher's committee and six independent technology "experts" reviewed the survey instrument. A total of twenty-two reviewers were enlisted and thirteen responded with suggestions for the improvement of the draft survey instrument. The challenges to validity were carried to all three types of people, as recommended by Dillman (1978): those described as colleagues, those who will be users of the data, and those in the population to be surveyed. Suggestions were included in the final draft of the instrument.

Not included in the study were provisions for construct, concurrent, and convergent validity. Concurrent validity requires that the survey instrument be judged against some other method of collecting the data that is accepted. A correlation between the two can then be determined. A high correlation suggests good concurrent validity. Construct validity is the most valuable, but the most difficult way of assessing the survey instrument. It requires years

of experience working with a survey. Convergent validity suggests that several different methods for collecting the same data will produce similar results (Litwin, 1995).

At the conclusion of needed staff development, instructional personnel will be required to demonstrate their skills according to an assessment procedure that was developed by the a Pilot Staff Development Committee. This new participatory committee was composed of the selected volunteers for the pilot staff development program scheduled for the summer. Because the original Action Committee was not available to meet during the summer, this substitution was part of the plan. The assessment component took the form of a portfolio of examples (authentic assessment). Knowledge of the assessment requirement was expected to encourage honest responses to the survey.

Analysis of the data.

To answer subquestions A and B, the Action Committee selected an assessment procedure designed to discriminate between those indicators about which the respondents felt proficient from those indicators they did not. For example, the Action Committee decided that a response of "Yes" or "User" or "Advanced" or "Instructor" to a desired computer skill or application exemplified proficiency while a response of "No" or "Unsure" or "Nonuser" or "Beginner" did not. A need for staff development was identified for those computer skills or applications that the respondent answered "No" or "Unsure" or as being a "Nonuser" or "Beginner." A full tabulation of all responses to the "indicators" chosen for the eight standards constituted the total data base.

The analysis of data consisted of three concurrent activities: data reduction, data display, and conclusion drawing (Miles & Huberman, 1987). The analysis depended upon the nature of the data; however, because it is quantitative, grouping the responses according to different groups aggregated the total data and allowed for clearer interpretation of the data. A matrix, using rows and columns, visually displayed the responses of each group on the

"indicators" for each standard. By displaying the data in this way, those indicators that needed to be included in the training were detectable. Those same data were displayed graphically in bar graph form. Identical tables and graphs are displayed for all indicators for each standard for the total sample and can be provided for each group surveyed.

To answer subquestion C it was anticipated that the Action Committee would identify several teacher groups, or combinations of groups, for analysis. The committee decided to combine the survey results for all elementary, all middle, and all high school teachers for comparisons.

After identifying the groups for analysis, the Action Committee determined the required cut off percentage of responders on each indicator that established the requirement for staff development. Where the percentage of responders fell below the cut off, training was customized for the total sample and could be customized for any of the groups surveyed.

Research Question Two: Designing a Staff Development Program

Subquestions.

A. What training activities are readily available to address the needs?

B. What training activities will have to be customized?

Analysis of the data.

In addition to addressing the training needs dictated by the results from the survey, the Action Committee needed to plan for the development of the assessment component. Therefore, the committee decided that a broad-based, generic training program was needed so that the assessment procedures for all of the standards could be developed.

In analyzing the survey data, seventy percent (70%) of the participants would be required to respond in a positive way before the need for staff development was diminished. The Action Committee sought to verify their staff development plan by focusing on selected needs identified from the survey. A subcommittee of the Action Committee planned and conducted the training activities. Emphasis was focused on the knowledge and skills required by standard #3.

Sources of staff development opportunities depended extensively on existing local expertise. A combination of commercially available software activities and many that were custom designed were selected for the four day pilot staff development sessions.

Research Question Three: Delivering the Staff Development Program

Subquestions.

A. How will personnel be grouped for training?

B.. Who will be in the pilot group?

Analysis of the data.

In answering subquestions A and B, the Action Committee selected a volunteer group of instructional personnel from those who identified themselves on the survey. The survey, designed to self-evaluate the technology proficiency of instructional personnel for this study, will become a pre-test for determining needed training and was used in this manner to select those invited to participate in the pilot group. In the future a detailed analysis of the results will enable the Action Committee to customize the staff development for the different groups surveyed. Staff development session(s) were offered in the summer of 1997, for the pilot group, and will be offered year round in the future. A Gantt Chart will be developed to schedule personnel seeking certification.

Research Question Four: Evaluating the Outcomes

Subquestions.

A. What level of proficiency will determine mastery on the technology standards for personnel?
B. How will instructional personnel be assessed to determine that they have mastered the proficiency level required by the standard?

An answer to subquestion A recognizes the recommendation of the Advisory Board for Teacher Education and Licensure (ABTEL) to leave the determination of proficiency on each standard to the local school division. The initial assessment (survey) developed by the Action Committee identified the need for staff development. In preparation for the development of the assessment process, the Action Committee defined the level of proficiency for each standard that determines mastery. They selected indicators of proficiency for each standard that were measurable and that required instructional technology that was available to personnel. After training is completed in those areas where proficiency is self-evaluated to be below mastery, the individual must then be assessed on all of the standards. Instructional personnel must demonstrate proficiency on all eight of the technology standards.

For subquestion B, the Action Committee promised the volunteers in the pilot staff development group that they would define evaluation criteria that must be achieved by instructional personnel in Gloucester County Schools to demonstrate compliance with the technology standards adopted by the Virginia Board of Education. This process took the form of demonstrating proficiency on a prescribed number of the standard's indicators and preparing a portfolio of performed tasks and examples. Generally, the standard's indicators required that specific tasks be accomplished using the appropriate technology. In many cases an example was produced through hands-on activities. Within each standard there was considerable

flexibility (Advisory Board on Teacher Education and Licensure, 1996). The portfolio will be evaluated by the immediate supervisor who will certify compliance to the Office of Human Resources on a form provided by that office.

Communicating the Outcomes

The results of the study will be communicated to personnel in Gloucester County Schools and shared as a model for other school divisions in the Commonwealth of Virginia?

Method.

The process outlined in this study will be condensed into a brochure that can be distributed through the Department of Education to other school divisions. It can serve as a prototype for addressing the problem of certifying to the state the technology proficiency of instructional personnel that is soon to be faced by all school divisions. It will provide assistance with stratified sampling, surveying current levels of proficiency, analyzing survey results, selecting and designing staff development activities, implementing the staff development sessions, and assessing compliance with the new technology standards for instructional personnel.

CHAPTER II

PRESENTATION AND ANALYSIS OF DATA AND SUMMARY OF FINDINGS

This chapter is a description of the gathering of the data for the study that includes a description of the final survey instrument, the administration of the survey to the sample, and the tabulation of the resulting responses.

Secondly, it provides a series of tables and graphs designed to organize the data and assist with pointing out the needs for future staff development. The initial presentation is a summary of all responding groups. In addition, tables and graphs are provided in an appendix for three combined groups: elementary, middle and high school instructional personnel. This demonstrates the potential for additional analysis of the data.

Thirdly, with the determination of needed staff development concluded, the selection of a pilot group is outlined. The reasons for choosing certain participants is specified. The design of the staff development sessions is explained and the evaluation of the training efforts is analyzed and presented.

Finally, the assessment component was developed with the aid of the pilot group. The Action Committee's definition of the minimum level of performance on the standards required for competence is listed. There remained the task of developing an assessment procedure that worked with the pilot group and can be used with all future instructional personnel seeking endorsement on the technology standards.

Gathering the Data

Developing the survey instrument.

The Action Committee developed a draft survey instrument designed to self-evaluate the technology proficiency of the respondent on indicators selected for the technology standards for instructional personnel under consideration by the Virginia Board of Education. To test validity it was repeatedly reviewed during its development by members of the Action Committee, who are the most knowledgeable on technology in the school division. In addition, members of the researcher's faculty committee and six experts from the Department of Education and other school divisions were invited to join in the review. The final draft of the survey instrument solicited responses from ten groups, as follows (see Appendix D to review the final draft of the survey instrument):

1. K-2 Regular Primary Teacher,
2. 3-5 Regular Elementary Teacher,
3. K-8 Resource Teacher,
4. K-12 Special Education Teacher,
5. 6-8 Regular Middle School Teacher
6. High School English or Social Studies Teacher,
7. High School Math or Science Teacher,
8. Fine Arts or Vocational Teacher,
9. Other High School Teacher, and
10. Non-Teaching Instructional Staff.

Asking the respondent to identify the particular group that best describes their instructional assignment, allows for comparisons among the different groups in analyzing the data.

The final draft listed one hundred twenty-five (125) indicators for the eight standards, as follows:

Standard #1------ seventeen (17) indicators

Standard #2------ twenty-seven (27) indicators for hardware terms

twenty-two (22) indicators for software terms

Standard #3------ fifteen (15) indicators

Standard #4------ eight (8) indicators

Standard #5------ eight (8) indicators

Standard #6------ ten (10) indicators

Standard #7------ fourteen (14) indicators

Standard #8------ four (4) indicators

After reviewing the sample surveys provided and on the advice of several reviewers, the Action Committee decided to use two (2) different response schemes. Indicators for standards #1, #2, and #8 were determined to be best answered by a response of (A) yes, (B) no, or (C) unsure. All other indicators for the remaining standards (standards #3, #4, #5, #6, and #7) would be best answered using a continuum of responses. The Action Committee chose (A) non-user, (B) beginner, (C) user, (D) advanced, and (E) instructor, as response choices.

Administering the survey.

During the spring of 1997, the survey instrument was administered to three hundred ninety (390) members of the instructional staff in Gloucester County Public Schools. To achieve a high level of participation, the instrument was responded to during a scheduled staff meeting at each school. Each participant was issued a copy of the survey instrument and a "bubble" response sheet. After a brief explanation of the reasons for the survey and the unique features of the instrument, it was completed by the participants and collected at the end of the session. The unique features included the participant's selection of a particular group in responding to items one (1) or two (2), the change in response choice from yes, no, or unsure to the continuum after item seventy-two (72), and the option to sign the "bubble" sheet. These features were discussed in some detail.

Signing the “bubble” sheet was completely optional. Those choosing to sign were told that the pilot group selected for initial staff development would be invited from the list of signees. Also, everyone was promised that those chosen for the pilot group would be given the opportunity to provide input into the design of an assessment procedure that will be used by instructional personnel in the school division to certify competence on the standards. One hundred twenty-nine (129) participants signed their “bubble” sheet, providing an ample pool of volunteers to make-up the pilot staff development group.

Because of the high number of participants, no effort was made to survey those absent from the meetings or on other assignments during the meetings. The numbers for each group are as follows:

- K-2 regular primary teachers ..... sixty-two (62)
- 3-5 regular elementary teachers ..... sixty-six (66)
- K-8 resource teachers..... twenty-six (26)
- K-12 special education teachers..... sixty-four (64)
- 6-8 regular middle school teachers..... sixty-four (64)
- High school English or social studies teachers..... twenty-eight (28)
- High school math or science teachers..... eighteen (18)
- Fine arts or vocational teachers..... fifteen (15)
- Other high school teachers..... thirteen (13)
- Non-teaching instructional staff ..... thirty-four (34)

<u>Tabulating the survey responses.</u>

Employing a “bubble” response sheet was intended to allow tabulation using machine scanning. Unfortunately, a “bubble” survey scan sheet that would accommodate one hundred twenty-five indicators was not available for the scanning equipment that was available. A “bubble” test scan sheet was chosen only to discover that the equipment reading the scan sheets could not discriminate the change in meaning of the response choices midway through the survey. In responding to items 1-2 the participant indicated the appropriate group that best represented their teaching assignment. Those results could be hand read and the tabulation by the scanning equipment ignored. However, for indicators 3-72, the response choices were (A) yes, (B) no, or (C) unsure. Response choices (D) and (E) were not used and ignored. For indicators 73-127, the response choices were (A) non-user, (B) beginner, (C) user, (D) advanced, (E) instructor. Because the available scan equipment could not be used, all responses had to be hand read and hand tabulated. The counts were entered into a computer using a spread sheet software allowing for future data manipulation. The total database is large. It includes responses from three hundred ninety (390) total participants according to the responses on one hundred twenty-five (125) different indicators and entered for ten (10) different groups.

In addition to being very time consuming, the two step process of counting and entering the raw data introduced human error factors that resulted in response counts for some indicators that were higher than the total number of participants. The highest count on a single indicator was three hundred ninety-two (392). This resulted in a maximum error of 0.3% for those counts, on the high side. All other counts would be in error to a lesser extent. Because some participants did not respond to all indicators, a total count less than the number of participants would be expected and indeterminable. Because the results were to be used qualitatively in defining a need for staff development and not to be used quantitatively, this level of error in tabulations was considered tolerable. Any human error factor in tabulating or entering data would not have influenced the decisions to include or exclude any knowledge or skills (indicators) from the staff development plan

Organizing and Presenting the Data

The purpose of surveying instructional personnel was to complete a needs assessment. Requiring personnel to complete a survey designed to self-evaluate their present level of knowledge and skills with the instructional technology addressed by the proposed standards, clearly identified those areas in need of staff development that will be required to raise instructional personnel's' level of knowledge and skills to the minimum level required by the new standards.

The initial task was to organize the large data base in a way that would identify the staff development needed for achieving competence, as defined by the Action Committee, on each standard. The spreadsheet software allowed for the necessary manipulation of the raw data.

Table 1 is an organizing all of the responses for standard #1: Operating a computer system and utilizing software. All participant responses tabulated for the seventeen (17) indicators of standard #1 were totaled, converted to percentages, and presented as percentages.

Table 1 is immediately followed by Figure 1, which presents a graphical picture of the percentages of participants who responded "Yes" to each indicator for standard #1, as a bar graph. It is the percentage of participants that self-evaluated that they can perform the task that is critical to the needs assessment.

Standard #2 is divided into two parts, 2a and 2b. It requires applying knowledge of terms associated with educational computing and technology for both hardware (a) and software (b). Table 2 contains the percentage of the total participants responding "yes," "no," or "unsure" to the twenty-seven (27) indicators listed for understanding the meaning of the hardware terms. It is immediately followed by Figure 2 that graphically presents the total percentages of participants responding "Yes" to each of the indicators.

Table 1

Number of Respondents and Percentage of All Participants by Level of Proficiency on Standard #1: Operate a Computer and Utilize Software. (N = 390)

Indicator	Respondents	% Yes	% No	% Unsure
3	388	97.7%	0.0%	2.3%
4	386	97.7%	0.0%	2.3%
5	388	97.4%	0.5%	2.1%
6	389	65.3%	19.3%	15.4%
7	388	85.8%	7.7%	6.4%
8	388	77.1%	11.1%	11.9%
9	387	61.5%	20.4%	18.1%
10	388	61.6%	20.1%	18.3%
11	389	75.1%	13.9%	11.1%
12	390	76.7%	14.9%	8.5%
13	390	54.1%	25.9%	20.0%
14	388	60.6%	22.9%	16.5%
15	390	61.3%	23.8%	14.9%
16	392	65.6%	19.6%	14.8%
17	391	35.5%	43.7%	20.7%
18	390	44.1%	39.0%	16.9%
19	390	61.8%	24.4%	13.8%

Note. Number of respondents > 390 are due to human error. Numbers < 390 may be due to respondent's failure to provide a response to the indictor. Indicators can be identified in the survey found in Appendix D.

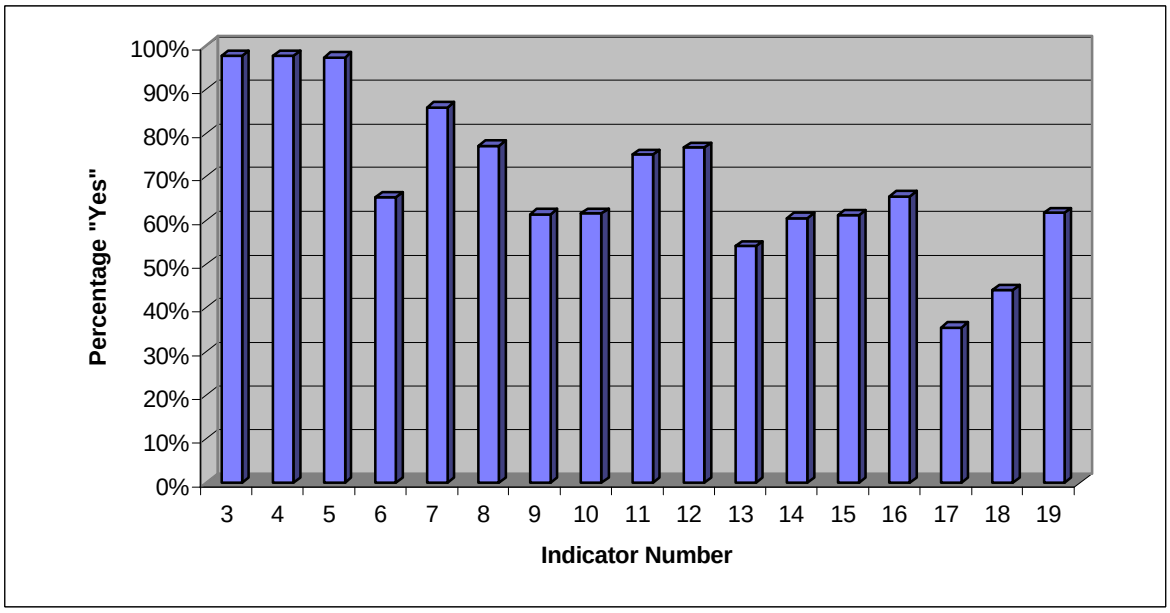

Figure 1. Percentages of participants responding yes to indicators for standard #1.

Table 2

Number of Respondents and Percentage of All Participants by Level of Proficiency on Standard #2: Apply Knowledge of Hardware Terms. (n = 390)

Indicator	Respondents	% Yes	% No	% Unsure
20	387	74.7%	19.4%	5.9%
21	389	99.0%	0.3%	0.8%
22	389	99.7%	0.0%	0.3%
23	391	98.0%	0.8%	1.3%
24	390	97.2%	2.1%	0.8%
25	390	99.5%	0.3%	0.3%
26	390	95.9%	1.3%	2.8%
27	388	71.1%	16.2%	12.6%
28	389	91.5%	3.1%	5.4%
29	391	84.7%	7.4%	7.9%
30	390	66.7%	19.2%	14.1%
31	390	79.0%	14.6%	6.4%
32	388	60.6%	29.4%	10.1%
33	389	40.4%	39.1%	20.6%
34	389	32.9%	44.0%	23.1%
35	388	29.9%	47.4%	22.7%
36	388	29.4%	48.5%	22.2%
37	392	61.5%	28.6%	9.9%
38	392	59.9%	28.6%	11.5%
39	391	15.9%	67.8%	16.4%
40	391	69.6%	21.0%	9.5%
41	389	38.3%	47.0%	14.7%
42	389	56.8%	29.3%	13.9%
43	390	13.8%	68.5%	17.7%
44	390	70.8%	19.7%	9.5%
45	390	78.2%	13.8%	7.9%
46	389	54.0%	31.4%	14.7%

Note. Number of respondents > 390 are due to human error. Numbers < 390 may be due to respondent's failure to provide a response to the indictor. Indicators can be identified in the survey found in Appendix D

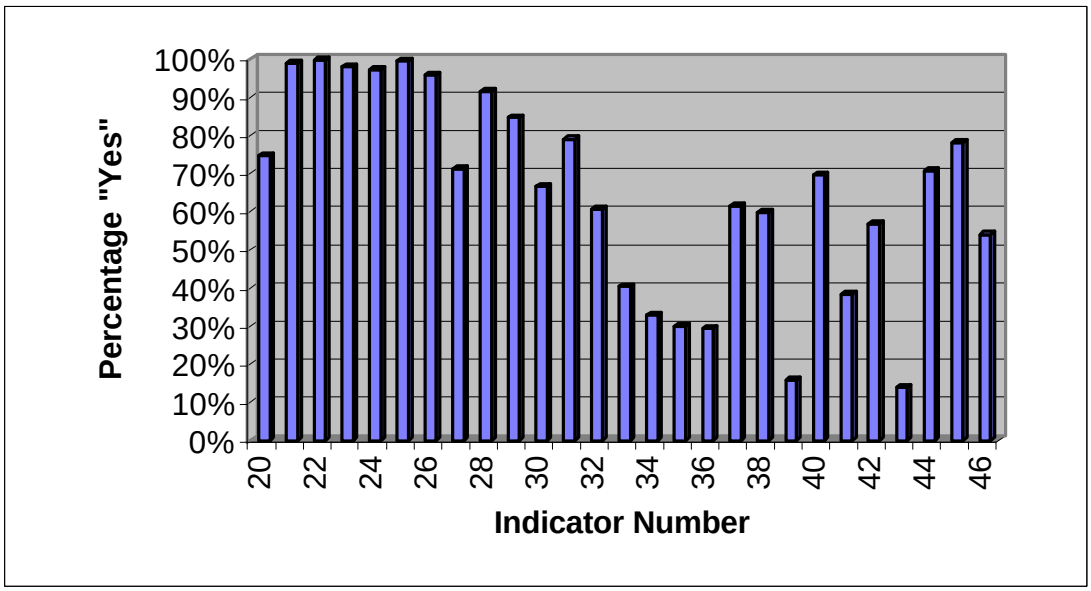

Figure 2. Percentages of participants responding yes to indicators for standard #2 (Hardware).

In a similar manner, Table 3 contains results for responses associated with the twenty-two (22) software terms. Figure 3 is the graphic of the data for positive responses on all indicators in a bar graph.

Results for standard #8 are presented in the next position, because responses for this standard follow the same format of “yes,” “no,” or “unsure.” Table 4 contains percentages of responses to each of the four (4) indicators of this standard. Figure 4 is a graphical presentation of the positive responses. The Action Committee determined that seventy percent (70%) of the participants needed to respond A (Yes) before the need for staff development was reduced.

Table 3

Number of Respondents and Percentage of All Participants by Level of Proficiency on Standard #2: Apply Knowledge of Software Terms. (n = 390)

Indicator	Respondents	% Yes	% No	% Unsure
47	390	92.8%	4.6%	2.6%
48	389	98.5%	1.0%	0.5%
49	389	98.7%	0.8%	0.5%
50	388	96.9%	1.8%	1.3%
51	389	96.4%	2.3%	1.3%
52	388	98.5%	0.8%	0.8%
53	388	96.1%	1.5%	2.3%
54	390	98.7%	0.3%	1.0%
55	390	93.6%	3.3%	3.1%
56	389	95.1%	0.8%	4.1%
57	389	92.0%	2.8%	5.1%
58	387	96.1%	2.3%	1.6%
59	390	73.3%	14.9%	11.8%
60	389	77.6%	14.1%	8.2%
61	389	61.2%	24.9%	13.9%
62	388	60.6%	25.0%	14.4%
63	389	88.7%	5.9%	5.4%
64	390	70.3%	19.2%	10.5%
65	390	76.4%	14.6%	9.0%
66	391	44.2%	37.1%	18.7%
67	388	12.4%	67.8%	19.8%
68	389	46.8%	35.5%	17.7%

Note. Number of respondents > 390 are due to human error. Numbers < 390 may be due to respondent's failure to provide a response to the indictor. Indicators can be identified in the survey found in Appendix D.

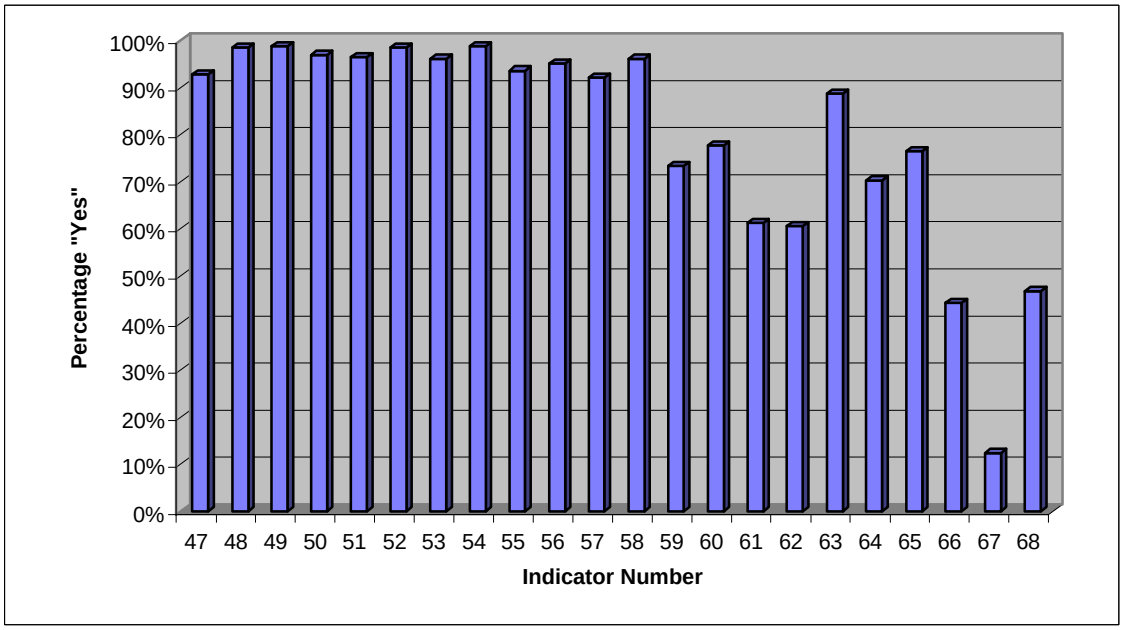

Figure 3. Percentages of participants responding yes to indicators for standard #2 (Software).

Table 4

Number of Respondents and Percentage of All Participants by Level of Proficiency on Standard #8: Demonstrate Knowledge of Ethical and Legal Issues. (n = 390)

Indicator	Respondents	% Yes	% No	% Unsure
69	389	71.7%	14.7%	13.6%
70	388	81.2%	8.8%	10.1%
71	389	78.1%	12.1%	9.8%
72	389	84.8%	7.5%	7.7%

Note. Number of respondents > 390 are due to human error. Numbers < 390 may be due to respondent's failure to provide a response to the indictor. Indicators can be identified in the survey found in Appendix D.

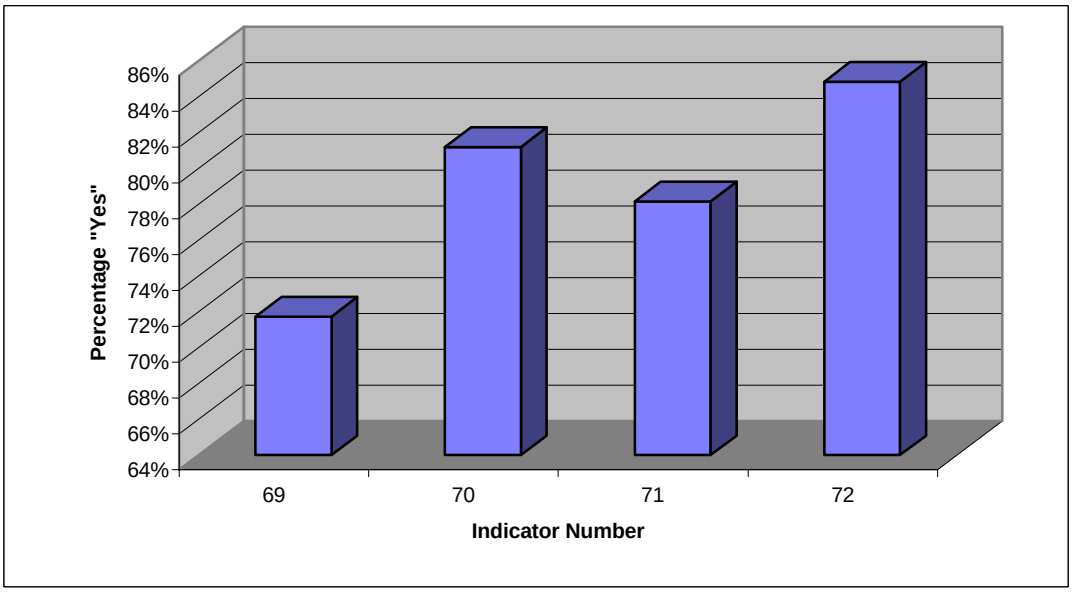

Figure 4. Percentages of participants responding yes to indicators for standard #8.

Beginning with standard #3 and continuing for standards #4, #5, #6, and #7 the response choices change from “yes,” “no,” or “unsure” to a continuum, as follows:

A) Non-user----- I am not able to use this skill.

B) Beginner----- I am beginning to use this skill for personal use.

C) User---------- I can use this skill to accomplish a simple task.

D) Advanced--- I have mastered this skill and can use it in complex applications.

E) Instructor--- I can use skill to instruct or guide others.

The Action Committee determined that seventy percent (70%) of the participants needed to respond C (user), D (advanced), or E (instructor) before the need for staff development was diminished. The total for each of the responses for each of the indicators was converted to a percentage and reported in the following tables:

Standard #3----------Table 5

Standard #4---------- Table 6

Standard #5---------- Table 7

Standard #6---------- Table 8

Standard #7---------- Table 9

The percentages of the responses for C (user), D (advanced), and E (instructor) were added for each indicator of standards #3, #4, #5, #6, and # 7. The totals were plotted for each standard, as a bar graph, according to the survey’s indicator number. These bar graphs are included as figures immediately following the tables.

Table 5

Number of Respondents and Percentage of All Participants by Level of Proficiency on Standard #3: Applying Productivity Tools. (n = 390)

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
73	384	25.5%	20.3%	30.7%	15.4%	8.1%
74	388	13.4%	13.7%	33.0%	24.0%	16.0%
75	390	39.2%	26.7%	20.3%	9.2%	4.6%
76	390	36.7%	23.3%	22.1%	13.3%	4.6%
77	391	38.6%	23.3%	21.7%	11.8%	4.6%
78	389	12.3%	12.3%	35.5%	24.2%	15.7%
79	387	15.8%	14.7%	33.9%	23.0%	12.7%
80	390	55.6%	14.9%	16.7%	6.9%	5.9%
81	389	39.3%	22.1%	20.8%	12.1%	5.7%
82	389	20.8%	18.0%	30.8%	19.0%	11.3%
83	389	21.9%	13.6%	32.6%	20.8%	11.1%
84	388	21.9%	27.8%	28.4%	16.2%	5.7%
85	386	21.8%	29.3%	29.3%	13.7%	6.0%
86	387	62.0%	18.6%	13.4%	3.9%	2.1%
87	389	48.1%	22.1%	18.5%	7.2%	4.1%

Note. Number of respondents > 390 are due to human error. Numbers < 390 may be due to respondent's failure to provide a response to the indictor. Indicators can be identified in the survey found in Appendix D.

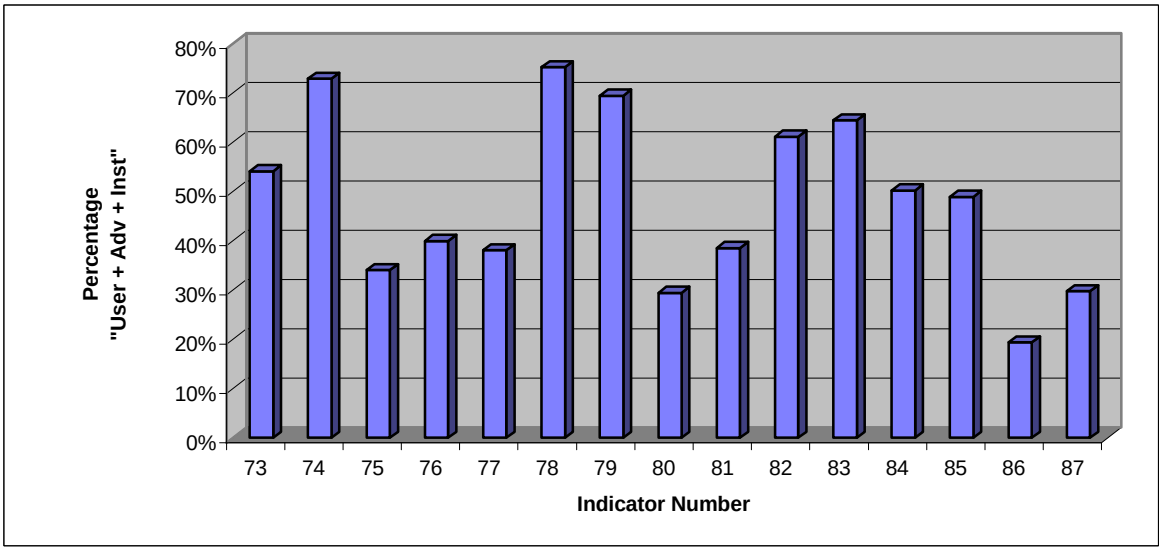

Figure 5. Percentages of participants responding (c) user, (d) advanced, and (e) instructor to indicators for standard #3.

Table 6

Number of Respondents and Percentage of All Participants by Level of Proficiency on Standard #4: Using Electronic Technologies with Information. (n = 390)

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
88	388	34.0%	22.2%	24.2%	14.9%	4.6%
89	387	22.5%	24.3%	31.0%	16.5%	5.7%
90	389	23.1%	28.5%	25.7%	16.7%	5.9%
91	391	29.4%	23.8%	26.3%	16.1%	4.3%
92	392	25.0%	23.2%	28.3%	17.1%	6.4%
93	389	37.3%	20.8%	23.4%	13.6%	4.9%
94	389	40.9%	21.9%	22.4%	11.1%	3.9%
95	389	41.6%	20.8%	23.7%	10.5%	3.3%

Note. Number of respondents > 390 are due to human error. Numbers < 390 may be due to respondent's failure to provide a response to the indictor. Indicators can be identified in the survey found in Appendix D.

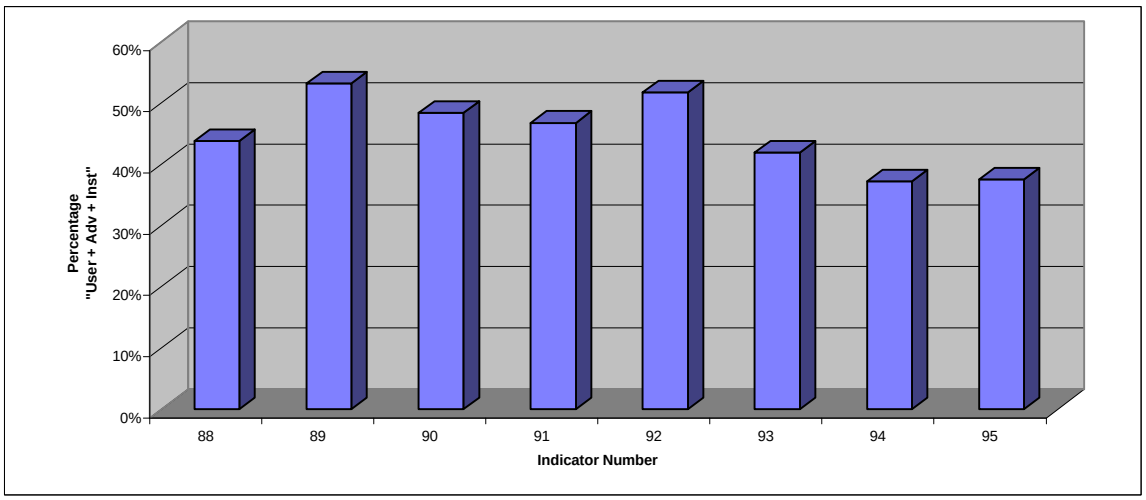

Figure 6. Percentages of participants responding (c) user, (d) advanced, and (e) instructor to indicators for standard #4.

Table 7

Number of Respondents and Percentage of All Participants by Level of Proficiency on Standard #5: Using Technology to Support Standards of Learning. (n = 390)

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
96	391	16.6%	32.7%	33.8%	14.1%	2.8%
97	392	19.6%	28.3%	36.2%	13.0%	2.8%
98	388	26.8%	27.1%	28.6%	13.4%	4.1%
99	386	23.8%	16.1%	35.8%	17.4%	7.0%
100	390	30.3%	23.8%	30.5%	10.3%	5.1%
101	387	40.8%	12.9%	25.6%	13.7%	7.0%
102	391	38.9%	19.9%	24.0%	12.3%	4.9%
103	390	30.3%	14.4%	32.1%	15.4%	7.9%

Note. Number of respondents > 390 are due to human error. Numbers < 390 may be due to respondent's failure to provide a response to the indictor. Indicators can be identified in the survey found in Appendix D.

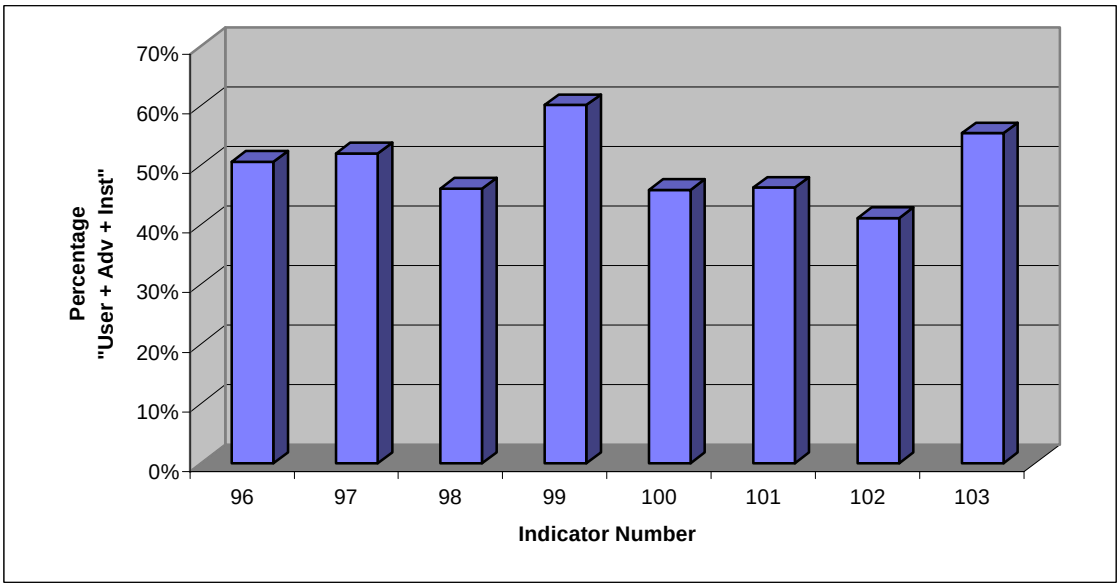

Figure 7. Percentages of participants responding (c) user, (d) advanced, and (e) instructor to indicators for standard #5.

Table 8

Number of Respondents and Percentage of All Participants by Level of Proficiency on Standard #6: Using Technologies Within the Curriculum. (n = 390)

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
104	386	13.7%	20.2%	31.3%	21.8%	13.0%
105	385	45.7%	22.6%	20.0%	8.1%	3.6%
106	387	45.5%	24.8%	16.0%	9.3%	4.4%
107	389	38.0%	24.4%	23.7%	9.3%	4.6%
108	386	49.7%	22.8%	16.6%	6.7%	4.1%
109	388	24.0%	24.7%	29.4%	12.9%	9.0%
110	389	57.3%	20.3%	14.9%	3.9%	3.6%
111	388	54.1%	20.1%	16.5%	5.4%	3.9%
112	388	44.8%	21.6%	19.6%	8.8%	5.2%
113	386	51.0%	20.5%	16.8%	8.5%	3.1%

Note. Number of respondents > 390 are due to human error. Numbers < 390 may be due to respondent's failure to provide a response to the indictor. Indicators can be identified in the survey found in Appendix D

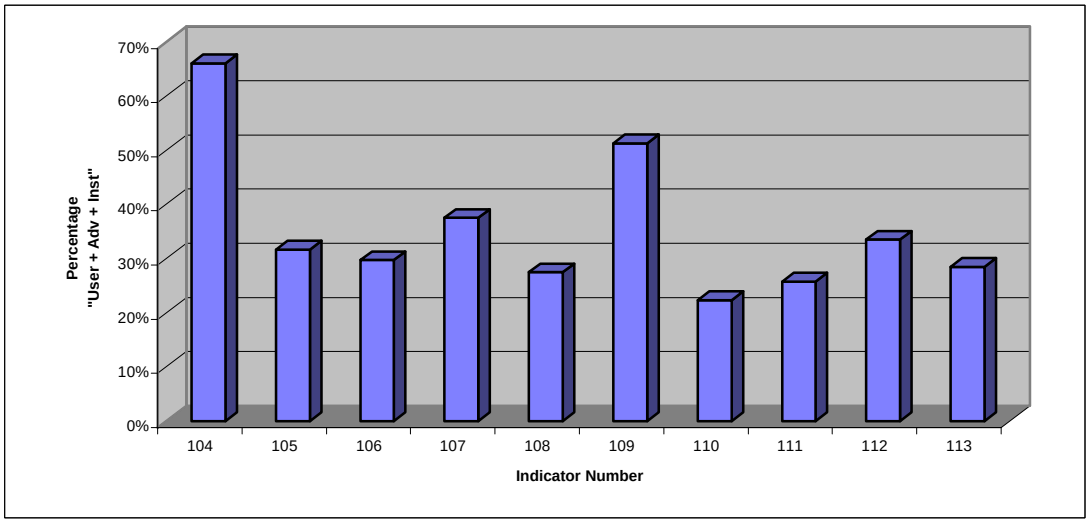

Figure 8. Percentages of participants responding (c) user, (d) advanced, and (e) instructor to indicators for standard #6.

Table 9

Number of Respondents and Percentage of All Participants by Level of Proficiency on Standard #7: Planning and Implementing Lessons and Strategies with Technology. (n = 390)

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
114	389	35.7%	27.5%	24.7%	7.7%	4.4%
115	387	37.5%	28.4%	22.2%	7.0%	4.9%
116	386	66.1%	16.6%	11.1%	4.7%	1.6%
117	387	50.9%	22.2%	16.8%	7.0%	3.1%
118	386	53.9%	23.3%	13.7%	6.7%	2.3%
119	387	17.8%	18.3%	39.8%	17.3%	6.7%
120	385	27.8%	17.7%	36.4%	13.0%	5.2%
121	387	26.9%	16.8%	36.4%	14.0%	5.9%
122	387	30.2%	14.0%	38.5%	11.9%	5.4%
123	386	52.6%	14.8%	21.8%	6.7%	4.1%
124	383	65.3%	13.3%	15.4%	3.9%	2.1%
125	386	76.2%	10.9%	8.8%	2.8%	1.3%
126	378	74.1%	14.3%	7.9%	2.4%	1.3%
127	376	30.9%	28.5%	27.4%	10.1%	3.2%

Note. Number of respondents > 390 are due to human error. Numbers < 390 may be due to respondent's failure to provide a response to the indictor. Indicators can be identified in the survey found in Appendix D.

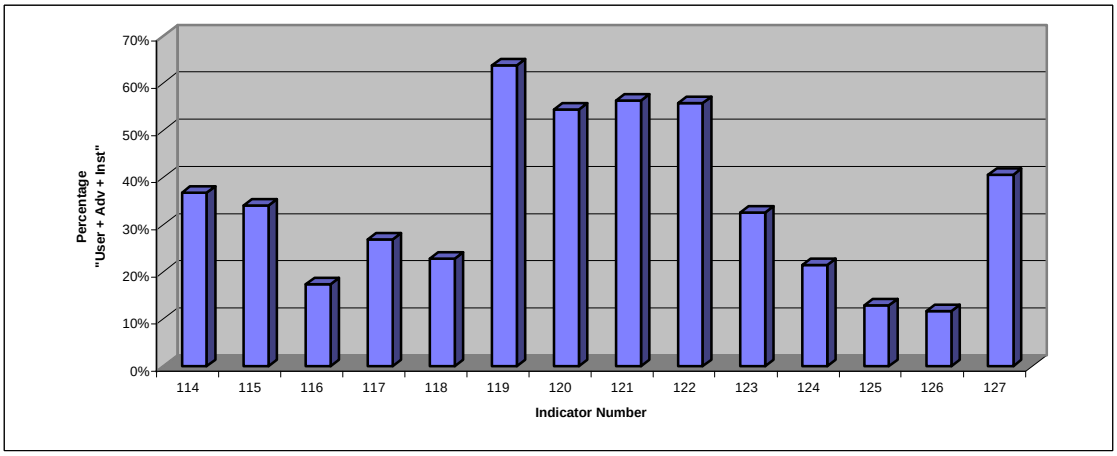

Figure 9. Percentages of participants responding (c) user, (d) advanced, and (e) instructor to indicators for standard #7.

Findings

What percentage of respondents must self-evaluate themselves as having the knowledge or skills and what level of that knowledge and skills should be expected? How many of the indicators, representing knowledge and skills, must be demonstrated by instructional personnel to be considered competent?

Required proficiency.

Although the Action Committee wanted to gather data from the participants on all one hundred-twenty five indicators, members realized that complete mastery of all the knowledge and skills (indicators) implied should not be required for certification at a minimal level of competence. The committee undertook the task of sorting those out that should not be included. The decisions were primarily based on the availability of the required instructional technology to participants. If available, it was included; if not, it was excluded.

The Action Committee determined that a competent person should have knowledge and skills associated with all seventeen (17) indicators specified in the survey for standard #1.

For standard #2, the committee felt that a knowledge of all the hardware terms would also be necessary. Therefore, a demonstration of competence on all twenty-seven (27) indicators specified in the survey would be expected. On the software side of standard #2, the committee excluded, as a requirement, an understanding of the knowledge and skills suggested by indicators 66 (utility program), 67 (Optical Character Recognition), and 68 (put away). Nineteen (19) indicators remained that would require a demonstration of competence.

For standard #3 a level of minimal competence should be expected for those knowledge and skills suggested by indicators 73-80, as listed in the survey instrument. Eight (8) indicators were retained for standard #3.

Five (5) indicators were identified for standard #4. They can be read from the survey instrument, as indicators 88-92.

All eight (8) indicators were retained for standard #5. The indicators are numbered 96-103.

The requirement for standard #6, identified in indicator numbered one hundred-eight (108), that the respondent model multi-media presentations to prepare instructional projects for students was excluded because of the very limited access to multi-media equipment in the school division at this time. The same was determined for the requirement called for by indicator number one hundred-thirteen (113). The eight (8) others remain an expectation for minimal competence.

For standard #7 only those knowledge and skills required in indicator numbers 117, 119, 121, and 127 were retained. All others were considered of limited availability or access and it would be unfair to expect proficiency from instructional personnel at even a minimal level.

Finally, all four (4) indicators were retained for standard #8. One hundred (100) of the total one hundred twenty-five (125) indicators of different knowledge and skills were retained for possible assessment that would lead to a certification of competence.

Interpreting the Tables and Figures.

Before the data can direct the needed staff development on the indicators that have just been identified, there remained the task of setting a response expectation. How many respondents should answer affirmatively or to a high degree of confidence on a required knowledge or skill before staff development need not be a strong concern?

The Action Committee selected a seventy percent (70%) response rate for this study. They wanted to identify a manageable number of skill areas for training. They also wanted to retain a minimum number of skills required as an indication of competence. The knowledge and skills in need of staff development for the eight (8) standards can now be determined.

Applying the seventy percent (70%) rule to Table 1 or Figure 1 and referencing the survey instrument, the following knowledge and skills (indicators) should be included for standard #1 in the design of the staff development program:

Being able to:

9. Copy files from the hard disk drive,
10. Copy files from a floppy diskette to the hard disk drive,
13. Delete software from a diskette,
14. Delete software from the computer's hard disk drive,
15. Use manuals to install software onto the computer's hard disk drive,
16. Use manuals to connect peripheral devices to a computer,
17. Determine the amount of RAM installed in the computer,
18. Determine the storage space available on the hard disk drive, and
19. Assemble the components of a computer according to packaged directions.

The data presentation suggests that special attention should be given to knowledge and skills called for in indicators #17 and #18, because the percentage of respondents indicating "yes" they can demonstrate those tasks falls below fifty percent (50%). Lowering the expectation for "yes" responses to fifty (50%) or sixty (60%) percent would further reduce and better focus the needs for staff development but would fail to provide instructional personnel with the knowledge and skills that will be necessary overall to demonstrate competence on the standards, as determined by the Action Committee. The Action Committee was concerned, if staff development focused only on indicators #17 and #18, instructional personnel would not be able to demonstrate knowledge and skills on all the indicators for standard #1, as required by the pilot group's assessment plan.

Remembering that standard #2 is divided into two parts: hardware and software, Table 2 and Figure 2 permit the identification of the knowledge and skills (indicators) for hardware terms that need to be included in the staff development plan:

Understanding the meaning of the following:

30. RAM.
32. External Port.
33. Parallel Printer.
34. Serial Printer.
35. Parallel Cable.
36. Serial Cable.
37. Modem Cable.
38. Peripherals.
39. SCSI.
41. LCD Panel.
42. Digital camera.
43. SCSI Cable.
46. Input-Output Device.

The data suggest that particular attention needs to be given to training in the knowledge and skills required by indicators 33, 34, 35, 36, 39, 41, and 43.

Table 3 and Figure 3 contain the data for the software portion required by standard #2. The need for staff development appears to be somewhat less, as follows:

Understanding the meaning of the following:

61. Application Program.
62. Operating System.

Remember that indicators 66-68 were not included among those subject to assessment to determine minimal competence and would not be stressed in staff development at this time.

Table 5 or Figure 5 contains the data for standard #3. The graphical representation in Figure 5 plots the sum of the responses (C) user, (D) advanced, and (E) instructor. The following knowledge and skills corresponding to the numbering format in the survey failed to meet the seventy percent (70%) criterion:

Being able to:

73. Use software to perform administrative tasks required by my position,
75. Use spreadsheet software to calculate students' grades,
76. Use database software to access student information,
77. Use database software for reporting student information,
79. Use software to prepare newsletters to communicate with students, parents, and the community, and
80. Use software to design overhead slides for use with a lesson.

The knowledge and skills suggested by indicators numbered 81-87 also fell below the seventy percent (70%) criterion but were previously excluded from assessment by the Action Committee because of the limited access to the instructional technology.

Table 6 and Figure 6 contain the data for all the indicators of standard #4. The response totals for indicators 88-95 fall below the seventy percent (70%) criterion. The Action Committee had excluded the knowledge and skills associated with indicators 93-95, leaving the following:

Being able to:

88. Access dial-up services,
89. Use an internet browser,
90. Effectively use an e-mail account,
91. Research information on the internet using search engines, and

92. Use electronic encyclopedias to locate relevant information.

Table 7 and Figure 7 contain data for standard #5. Again, the responses for all eight (8) indicators were below the seventy percent (70%) criterion and the Action Committee felt that competence was necessary for all. Staff development plans, therefore, needed to provide for:

Being able to:

96. Use electronic resources available in a school media center,

97. Use the electronic resources available in a modern library,

98. Evaluate relevant software for purchase for use with computers in the classroom,

99. Use software that is designed for "drill and practice" with computers in the classroom,

100. Use software specifically designed to supplement instruction,

101. Use voice technologies in conducting lessons that specifically address SOL's,

102. Use data technologies in conducting lessons that specifically address SOL's, and

103. Use video technologies in conducting lessons that specifically address SOL's.

Table 8 and Figure 8 contain results for standard #6. For indicators 104-113, the Action Committee excluded indicators 108 and 113. The remaining response totals for indicators 104-107 and 109-112 were way short of the seventy percent (70%) criterion, except word-processing skills (104). Staff development plans should include:

Being able to:

104. Model the use of word-processing for my students,

105. Model the use of spreadsheets for my students,

106. Model the use of database software for my students,

107. Model the use of telecommunications as a component of instruction for my students,

109. Engage students in using word-processing software as a part of a lesson,

110. Engage students in using spreadsheet software as a part of a lesson,

111. Engage students in using database software as a part of a lesson, and

112. Engage students in my classroom in using telecommunications as a part of a lesson.

Table 9 and Figure 9 contain results for standard #7. From the long list of knowledge and skills that would be required in response to indicators 114-127, the Action Committee decided that instructional technology resources available to personnel allowed for the inclusion of only four (4) indicators. The results for all indicators are predictable using the limited availability rationale. Total responses were relatively high for 119 and 121 and fair for 127; they all still fell below the seventy percent (70%) criterion. These are taken from the survey instrument as follows:

Conducting lessons that:

117. Have students use telecommunications software to support their learning,

119. Utilizes a single computer in the classroom,

121. Utilizes a class-size computer lab, and

127. Effectively utilizes an automated library media center.

Table 9 and Figure 9 contain results for standard #8. Proficiency would be expected on the knowledge and skills required by all four (4) indicators. For the first and only occasion, response totals all exceeded the seventy percent (70%) criterion and would not need to be emphasized in the staff development plan.

Selecting a Pilot Group for Staff Development

Participants were invited to sign the survey response sheet if they wanted an opportunity to attend the pilot staff development session and offer input into the determination of the assessment component. One hundred twenty-nine (129) participants volunteered their signature. The Action Committee established the following criteria for inviting a select pilot group:

1. Members must be representative of the total sample of participants,

2. Members must have a good knowledge of computer literacy skills exemplified by their positive responses to the indicators for standards # 1 and #2,
3. Members must have a working knowledge of word-processing software, and
4. Members must respond that they lack skills in the use of spreadsheet and database software.

The intent was to select a relatively homogeneous pilot group that could participate in a staff development program and then be reassessed using the same survey instrument. Being sure to include in the staff development specific instruction in the use of spreadsheet and database software would provide a measure of the effectiveness of the overall process of pre-assessment, staff development, and post-assessment.

From the pool of one hundred twenty-nine original participants who signed the survey response sheet, some thirty potential volunteers were identified as meeting the criteria, and they were invited to participate in the pilot staff development session scheduled for mid-summer. Fifteen responded to the invitation in the affirmative and ultimately participated in the pilot group. Members represented the following surveyed groups:

1. 3-5 regular elementary teachers .....2 participants
2. K-8 resource teachers.....1 participant
3. K-12 special education teachers.....2 participants
4. 6-8 regular middle school teachers.....2 participants
5. High school English or social studies teachers.....2 participants
6. Non-teaching instructional staff .....6 participants

The non-teaching instructional staff included two elementary principals, two high school guidance counselors, one elementary supervisor, and one gifted coordinator. Although all surveyed groups were not represented, the pilot group met the goal set by the first criterion which was to select a group that was representative of the total sample.

Designing Staff Development

The Action Committee decided to design a staff development program for the pilot group that would address all eight (8) standards and the knowledge and skills required by the one hundred twenty-five different indicators, as directed by the findings from the survey data. Those knowledge and skills, required for competence, that fell below the seventy percent (70%) criterion were to be included and emphasized. By so doing, a complete assessment procedure on the standards could be developed for future use with instructional personnel. This would also provide for input from the pilot group on that total procedure, as promised (see Appendix E to review the plan of activities for staff development).

To accomplish this considerable undertaking, a twenty-four (24) hour staff development program was planned. It would be provided on four (4) consecutive days with three (3) hour sessions planned for each mornings and afternoon on each day. The plan called for a one (1) hour mid-day break for lunch.

The morning of the first day was dedicated to knowledge and use of terms associated with computing and technology addressed by standards #1 and #2. Trainers were sure to include those receiving a positive survey response from less than seventy percent (70%) of the participants. Because respondents had self-evaluated their skills fairly high in this area, only a brief amount of training time was committed to the topics addressed by standards #1 and #2.

In the afternoon session of day one, trainers began preliminary instruction on word processing skills addressed in standard #3. At the end of the first day, input was solicited from the pilot group regarding the desired procedures for the assessment of competency for standards #1 and #2. Instruction and practice exercises on word processing continued into the morning session on day two.

Because survey results suggested participants needed more help with the use of database and spreadsheet software than word processing software, training quickly turned to

using database software. A majority of this day was dedicated to instruction and activities required in the use of database software. Day two concluded with a session on using word processing and graphics software to prepare working documents for use in the classroom: brochures or certificates.

On day three attention turned to understanding and using spreadsheet software. Beginning with terminology and ending with practice activities, participants spent most of the day training in the use of this type of software. The day concluded with more practice using word processing and graphics software for communication with the creation of a sample newsletter.

Days two and three are critical to this study because training focused on the knowledge and skills needed for proficiency with standard #3. Responses on the survey instrument associated with this standard were the basis for the selection of the pilot group, and the pre- and post-assessment exercise using the survey instrument is keyed to improving participants' proficiency with database and spreadsheet software.

Table 10 contains the percentage of responses by the participants in the pilot group before staff development contrasted to the responses of the same participants after staff development for standard #3. Applying productivity tools for professional use involving spreadsheet and database software was the focus for the assessment (see Appendix F for Tables 12-19 containing before and after data for all other standards).

Figure 10 displays the before and after percentages of the responses to indicators 73-77, as a bar graph. Referring to the survey instrument, those indicators require the respondent to:

Table 10

Number of Respondents and Percentage of Pilot Participants by Level of Proficiency on Standard #3: Applying Productivity Tools.

	Before Staff Development						**After Staff Development**					
Indicator	**Respondents**	%Non-User	%Beginner	%User	%Advanced	%Instructor	**Respondents**	%Non-User	%Beginner	%User	%Advanced	%Instructor
73	15	26.7%	20.0%	40.0%	6.7%	6.7%	12	8.3%	0.0%	58.3%	33.3%	0.0%
74	15	20.0%	6.7%	46.7%	20.0%	6.7%	12	8.3%	0.0%	33.3%	41.7%	16.7%
75	15	33.3%	46.7%	13.3%	6.7%	0.0%	12	8.3%	0.0%	50.0%	41.7%	0.0%
76	15	40.0%	26.7%	33.3%	0.0%	0.0%	12	8.3%	0.0%	75.0%	16.7%	0.0%
77	15	33.3%	40.0%	26.7%	0.0%	0.0%	12	8.3%	0.0%	66.7%	25.0%	0.0%
78	15	20.0%	0.0%	53.3%	20.0%	6.7%	12	8.3%	0.0%	33.3%	50.0%	8.3%
79	15	26.7%	6.7%	40.0%	20.0%	6.7%	12	8.3%	0.0%	50.0%	33.3%	8.3%
80	15	60.0%	20.0%	20.0%	0.0%	0.0%	12	0.0%	41.7%	41.7%	16.7%	0.0%
81	15	33.3%	33.3%	26.7%	0.0%	6.7%	12	8.3%	8.3%	50.0%	33.3%	0.0%
82	15	20.0%	26.7%	26.7%	20.0%	6.7%	12	8.3%	8.3%	33.3%	41.7%	8.3%
83	15	20.0%	20.0%	33.3%	20.0%	6.7%	12	8.3%	8.3%	33.3%	41.7%	8.3%
84	15	26.7%	26.7%	40.0%	6.7%	0.0%	12	8.3%	16.7%	50.0%	25.0%	0.0%
85	15	20.0%	26.7%	53.3%	0.0%	0.0%	12	8.3%	16.7%	58.3%	16.7%	0.0%
86	15	46.7%	46.7%	6.7%	0.0%	0.0%	12	16.7%	25.0%	33.3%	25.0%	0.0%
87	15	46.7%	40.0%	6.7%	6.7%	0.0%	12	8.3%	25.0%	25.0%	41.7%	0.0%

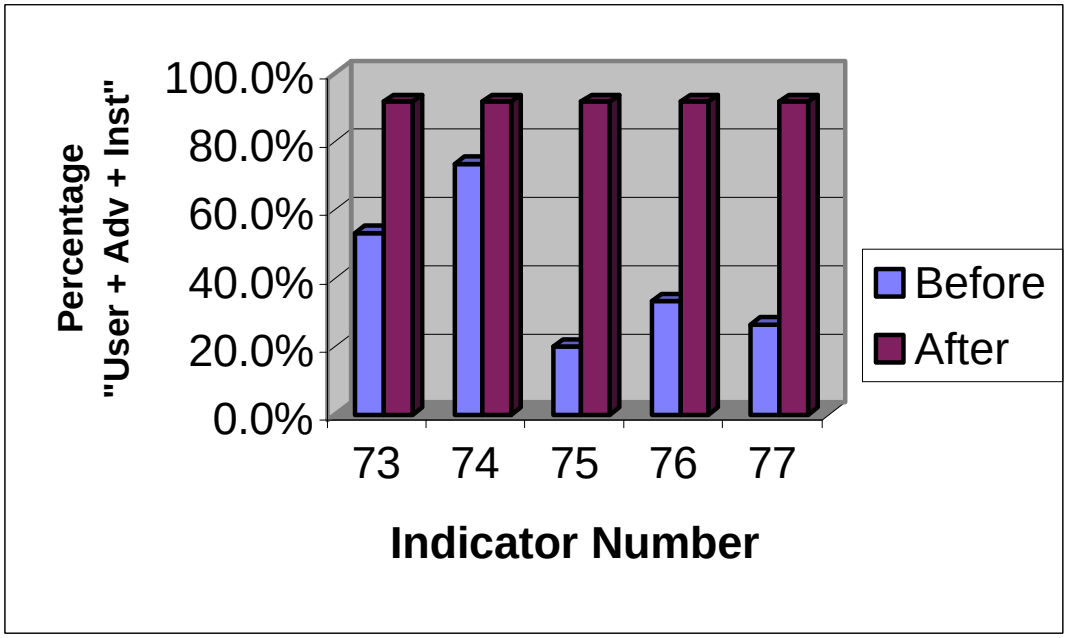

Figure 10. Percentages of participants responding (c) user, (d) advanced, and (e) instructor indicators for standard #3.

73. Use software to perform administrative tasks required by my position, such as maintaining attendance records or completing reports,
74. Use word-processing software to prepare working papers as required by my position,
75. Use spreadsheet software to calculate students' grades,
76. Use database software to access student information, and
77. Use database software for reporting student information.

Using telecommunications software was the central theme of the training on the fourth day. Participants used an internet browser and its many features to access information on the worldwide web. Some additional time was spent on preparing classroom presentation materials and communication devices. The session concluded with continued discussion on the assessment of proficiency for the remaining standards and the re-survey using the same survey instrument responded to previously by participants in the pilot group.

Deciding on the Proficiency Assessment Plan

The minimum level of performance expected for each standard was determined by the Action Committee. The required knowledge and skills was taken from the survey instrument by identifying selected indicators for each standard. They became the criterion for all instructional personnel. The pilot group was challenged with recommending a procedure that would be put in place and used to certify competence on the standards.

Assessing Proficiency

Participants in the pilot staff development group provided input to the design of an assessment procedure for use in certifying proficiency on the instructional technology standards. Again, the basis of the assessment procedure follows the knowledge and skills listed in the survey instrument for each standard. Applicants for certification will develop a portfolio

that will contain documents demonstrating the knowledge and skills required to exemplify proficiency on each standard. The portfolio is to be reviewed by an evaluator and, if satisfactory, certified to the Department of Human Resources using a form provided by that department (see Appendix G for the assessment recommendations and the portfolio contents list).

Assessing standard #1: Operate a computer system and utilize software.

The applicant would demonstrate proficiency through a hands-on exercise with the evaluator who would use a checklist. The checklist would require performance of some or all of the following:

- Turn on and shut down a computer and its peripherals,
- Format or initialize a blank diskette,
- Insert and eject a diskette and a CD-ROM,
- Save files to the hard disk drive, a floppy diskette, or a removable storage device,
- Copy files from a floppy diskette to the hard drive and vice versa,
- Delete data from a floppy diskette and the hard disk drive,
- Remove or delete software from the hard disk drive,
- Use manuals and package instructions to assemble components of a computer and its peripherals,
- Use manuals to install software, and
- Determine a computer's installed RAM and available hard disk drive storage space.

The portfolio would contain the checklist document with the signatures of the applicant and the evaluator. The document would be provided on a CD-ROM developed for this procedure.

Assessing standard #2: Applying knowledge of terminology associated with educational computing and technology.

With hardware and related terms, the assessment would consist of a drag-and-drop exercise using pictures and definitions. The exercise would be completed using a computer. Pictures and definitions would include, but not be limited to, CPU, monitor, keyboard, diskette, hard drive, mouse, CD-ROM, peripherals, modem, disk drive, printer, scanner, digital camera, LCD panel, video projector, and laser disc player.

With software and related terms, the assessment would be a matching exercise using the terms and their definitions. The list would include, but not be limited to, boot, cursor, double or single click, drag, open, close and put away, shut down, trash, delete, icon, desktop, folders, files, font, directories, format or initialize, application program, operating system, load or install, and backup.

Both exercises would be contained on the CD-ROM developed for the procedure. The portfolio would contain two documents. One for the hardware drag-and-drop activity and the second for the software match.

Assessing standard # 3: Apply productivity tools for professional use.

The applicant would be required to provide documents that they had produced, using each of the following software programs:

- Word processing,
- Database,
- Spreadsheet, and
- Overhead slide

The documents should reflect appropriate utilization of the software, as required by the applicant's position with the school division. A copy of each document would be included in the portfolio.

Assessing standard #4: Use electronic technologies to access and exchange information.

Create documents that demonstrate results from the following:

- Using an Internet browser such as Netscape to gain access to the worldwide web,
- Using an e-mail account to communicate,
- Researching information on the internet using search engines, and
- Accessing electronic encyclopedias.

The portfolio would contain copies of a document exemplifying each of the four tasks.

Assessing standard #5: Identify, locate, evaluate, and use appropriate instructional technology-based resources to support Standards of Learning and other instructional objectives.

Satisfying standard #5 will require the applicant to discover the sources of instructional technology availability in the school. A survey will be requested of the resources inventoried in the school library media center, the teacher resource center, and other depositories of instructional supplies.

Specific attention should be directed to the availability of relevant software designed to enhance instruction through drill and practice, delivery of a lesson, and productivity. Examples of student work using these software programs would be generated for inclusion in the portfolio.

The survey should also include a listing of relevant audio and video technologies that are present that could be used in the applicant's instructional program.

The portfolio would contain six (6) documents:

1. A list of electronic resources,
2. A list of software resources,
3. Student's example #1,
4. Student's example #2,
5. A list of audio technologies, and
6. A list of video technologies.

Assessing standard #6: Use educational technologies for data collection, information management, problem solving, decision making, communications, and presentations within the curriculum.

The applicants will provide two (2) documents through which appropriate uses of technology are modeled, using their choice of the following software:

- Word processing for students,
- Spreadsheets for students,
- Database software for students, and
- Telecommunications, as a component of instruction.

The applicant will also provide two (2) student-generated documents, each of a different type, which resulted from having students engaged in the use of the following software:

- Word processing software, as a part of a lesson;
- Spreadsheets, as part of a lesson;
- Database software, as part of a lesson; and
- Telecommunications, as a part of a lesson.

The portfolio would contain the four (4) documents, as specified--two (2) from the applicant and two (2) from students.

Assessing standard # 7: Plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings.

The applicant will be asked to provide documentation in the form of lesson plans or supplementary materials which exemplify the incorporation or utilization of any two (2) of the following:

- Conducting a lesson that requires students to use telecommunications software to support their learning, or

- Conducting a lesson which incorporates one of the following, dependent upon the availability of the necessary technology:

    1. Utilizing a single computer in the classroom,

    2. Utilizing a class-size computer lab, or

    3. Utilizing an automated library media center.

The portfolio would contain two (2) documents exemplifying the instructional use of telecommunications, single computer classroom configuration, laboratory computer configuration, or resources accessed through an automated library media center.

Assessing standard #8: Demonstrate knowledge of ethical and legal issues relating to the use of technology.

Instructional personnel serve as models of the proper use of technology. They need an understanding of the complex issues regarding the legal and ethical uses of all technology. They must model to students:

- An understanding of applicable copyright laws,

- The legal use of licensed software,
- The ethical use of Internet resources for educational purposes, and
- The responsible use of computer hardware.

Rather than attempt a spot check assessment of these important issues, the participants in the pilot group recommended that the topics be stressed in all staff development sessions and measurement not be attempted for the portfolio. In summary, the portfolio would contain all documents listed in Table 11.

When complete, the portfolio will be reviewed with the applicant by the building principal or a designee. If satisfactory, competence on the standards will be certified to the Human Resources Department of Gloucester County Public Schools on a form provided by that department and signed by the applicant and the reviewer.

Table 11

Portfolio Documents.

Document Number	Document Name	Origin	Standard
1	Checklist	CD-ROM	1
2	Hardware Match	CD-ROM	2 (Hardware)
3	Software Match	CD-ROM	2 (Software)
4	Word-processing Sample	Applicant Created	3
5	Database Sample	Applicant Created	3
6	Spreadsheet Sample	Applicant Created	3
7	Overhead Slide	Applicant Created	3
8	Browser Sample	Applicant Supplied	4
9	Search Sample	Applicant	4
10	Electronic Mail Sample	Applicant	4
11	Electronic Encyclopedia	Applicant	4
12	Electronic Resources	Form on CD-ROM	5
13	Software Resources	Applicant	5
14	Student Example	Student-Centered	5
15	Student Example	Student-Centered	5
16	Voice Technology	Applicant	5
17	Video Technology	Applicant	5
18	Applicant Model	Applicant	6
19	Applicant Model	Applicant	6
20	Student Product	Student	6
21	Student Product	Student	6
22	Document 1	Applicant	7
23	Document 2	Applicant	7
None required for standard #8			

CHAPTER III

CONCLUSIONS, IMPLICATIONS FOR PRACTICE, AND RECOMMENDATIONS FOR DEVELOPING THE MODEL

The Virginia Board of Education is considering instructional technology standards that will apply in the future to licensed professionals in Virginia. Local school divisions will be burdened with the task of designing a process that will provide training for personnel and ultimate certification of their competence to the Board. This study is an example of a workable process that could be replicated by a local school division.

A survey was designed and administered to all instructional personnel self-assessing the current level of proficiency on indicators identified for the standards. From the results of this self-assessment, knowledge and skills were identified that are in need of training through staff development activities. Staff development was planned from the results of the needs assessment and actually conducted for a pilot group. From their experiences, members of the pilot group assisted with the designing of an assessment of individual competence. Future applicants for certification of competence must produce a portfolio containing specific checklists, documents, and examples as developed by the pilot group.

Conclusions

Conclusions to this study evolve from the original research questions. Research question one focused on assessing the needs for staff development to achieve the standards soon to be established by the Virginia Board of Education. The Action Committee identified specific indicators that would demonstrate proficiency on each of the eight standards. These were developed into a survey instrument designed to permit a self-evaluation of the knowledge

and skills that instructional personnel currently possess. Considerable effort was expended to validate the instrument.

A review of the findings for the total sample of participants shows a clear identification of the knowledge and skills that need attention. Setting the criterion at seventy percent (70%) of participants responding in the affirmative to a specific indicator of a standard, resulted in fifty-five (55) of the original one hundred twenty-five (125) indicators requiring staff development attention. The number required would increase or decrease as the criterion is changed. The survey instrument did its job of providing a useful needs assessment and can be administered to a large number of participants or to individuals who wish to self-evaluate their current proficiency on the proposed standards.

In addition to the total sample, the considerable data were tabulated and graphed for three subgroups of participants from whom responses were collected: elementary, middle, and high (see Appendix H to review Tables 20-46 and Figures 11-37). The number of responses, expressed as percentages, differ among the three groups, but those indicators receiving affirmative responses less than seventy percent (70%) match closely those of the total sample, as to the knowledge and skills determined to be in need of training. The differences in the data would not have changed the selection of staff development for the pilot group.

For standard #3, which deals with the use of word-processing, spreadsheet, database, and presentation software, all three groups compared well to that of the total sample. This affirmed the decision of the Action Committee to select a pilot group for staff development that was representative of the total sample even though the percentage of participants from the combined high school group consistently responded in the affirmative at a higher level. Further analysis is possible, if a more customized staff development plan is required for a particular group.

The second research question dealt with the design of a staff development program. Activities were both custom designed and selected from commercially available sources. The focus areas for staff development were in the use of word processing, spreadsheet, database, and presentation software as required to satisfy standard #3. The survey results before staff development and those after staff development for this standard were dramatic. No less dramatic were the comparisons for all other standards addressed in the staff development session.

A generic staff development plan that addressed all the standards was necessary for the pilot group in order to design the assessment component. It is not otherwise recommended. Training on all eight standards in multi-day, multi-hour, marathon sessions was too much.

The experiences of the pilot group produced the following recommendations:

- All personnel should be initially trained in the mastery of basic computer skills and terminology. The demonstration of basic computer "literacy" should become a prerequisite for any other technology training class,
- Training be organized into four (4) sessions:
    1. Basic computing skills and related terminology (standards 1 & 2),
    2. A library media center session (standards 5 and 8),
    3. An Internet session be offered (standards 4 and 8),
    4. Integrated applications at an introductory level (standards 3, 6, and 7).
- Additional mini-courses should be made available. Examples are:
    1. Beginning Apple Macintosh,
    2. Beginning Windows 95 (or latest edition),
    3. ClarisWorks,
    4. SuperPaint,
    5. HyperStudio,
    6. PowerPoint,
    7. WebWhacker,

8. Astound,
9. PageMaker,
10. Searching the Internet,
11. Advanced Internet,
12. Troubleshooting the Macintosh and PCs.

The delivery of the staff development program to a pilot group was the topic of research question three. The selection of that group has been detailed earlier and members were representative of the total sample of participants.

With research question four, evaluating the outcomes of the staff development was at issue. The question was answered earlier in the Findings section of this study. The Action Committee set the level of competence expected for a current definition of mastery at a low level. The Action Committee was concerned that the limited availability of instructional technology to staff would result in the setting of a high level of competence being an unfair expectation. The actual level, based on the limited availability of instructional technology, ended up disappointingly low.

As promised, the participants in the pilot group assisted with determining the assessment piece. A portfolio assessment was decided upon and the details were identified for documentation. Participants actually produced many of the required documents during the pilot staff development sessions.

Implications for Practice

The intent of this study was to develop a prototype that would enable instructional personnel to certify competency on the instructional technology standards under consideration by the Virginia Board of Education. Instructional personnel in Gloucester County Public

Schools have participated in the development of a process that will enable them to satisfy this new requirement.

An assessment tool is in place that can be used to self-evaluate current proficiency on carefully selected indicators of the skills required by the eight standards that are under consideration by the Virginia Board of Education. It can be used by individuals who want to self-assess their current level of proficiency and it can be used in assessing the proficiency of groups.

The survey data are an indication of the need for specific staff development. Experiences with the pilot staff development group resulted in the recommendation that a selection of mini-courses be made available to instructional personnel. The mini-courses will provide training in the knowledge and skills that are directly related to the standards.

A local school division will establish the proficiency required for each standard that is a demonstration of a minimum level of mastery. For Gloucester County Public Schools the Action Committee considered the availability of the technology to instructional personnel in making the determination.

A post-assessment procedure must be implemented to determine an individual's proficiency at the expected minimum level of mastery. The pilot staff development group decided to implement a portfolio assessment. After accumulating documentation in an individual's portfolio, it can be certified through a review process and reported to the Department of Human Resources of Gloucester County Public Schools.

The key features of the process will be condensed into a booklet that will be available to all instructional personnel in the school division. It will be shared with the Virginia Department of Education and can be made available to other school divisions who want to

custom design their own process. By so doing, the implications for the use of the results of this study are significant.

Recommendations for Developing the Model

The availability and use of instructional technology grows each day. Instructional personnel are, generally, advanced beyond a literacy level. Survey results suggest that they feel good about basic operation of a computer system, using software, and understanding common terminology as required to satisfy standards #1 and #2. They think that they have command of ethical and legal issues relating to the use of technology as required to satisfy standard #8. In addition, they feel fairly good about some personal applications involving the use of word processing software as partially required to satisfy standard #3. Beyond these good feelings, the survey results may be disappointing to many. Helping teachers integrate sophisticated technology into their instructional program as required to satisfy standards #4-#7 remains a major challenge. In anticipation that the skills of instructional personnel will improve, improvements to the model are recommended.

The assessment instrument will require periodic up-dating. New technologies and applications are sure to arrive on the scene, such as touch-screen and voice-activated computer models that were not included among the knowledge and skills in the pre-assessment instrument used in this study.

Changes to staff development plans will be warranted as the proficiency level of instructional personnel advances. Pre-assessment results will better identify and should reduce the knowledge and skills that will require future development. The resulting staff development may be very different.

Adjusting the seventy-percent (70%) criterion for the percentage of affirmative responses required on a particular indicator would alter the findings in future studies. The knowledge and skills identified for staff development would change, as would the delivery of the training. The proficiency level for mastery would be affected, as would the post-assessment procedure. Further development of this nature will be desirable as the proficiency of instructional personnel improves.

Although the results of the needs assessment for the combined groups of elementary, middle, and high school instructional personnel were similar to that of the total sample, a generic staff development plan was not the final recommendation. Further research is needed in analyzing the differences in the percentage of participants' responses to the many indicators among the ten groups identified in the sample. A more customized plan of staff development for specific groups may prove more effective in accelerating the necessary training.

For this study the proficiency level required for mastery of several of the standards was limited by the Action Committee, based on the availability and access to the instructional technology currently in place in the school division for instructional personnel. As that availability and access improves for personnel, further development will be needed to re-define a new mastery level to be expected before certification on the standards.

Additional consideration is recommended on the appropriateness of portfolio assessment in arriving at the certification of mastery on the eight standards. Not only can this authentic assessment procedure be refined, there may be a much better assessment method available for this purpose.

Finally, the process outlined in this study needs to be modeled in other school divisions. Will the process determining staff development needs to achieve computer technology competence by instructional personnel in Gloucester County Public Schools transfer to other school divisions without having to re-invent the entire effort?

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Appendix A

TECHNOLOGY STANDARDS FOR INSTRUCTIONAL PERSONNEL

DRAFT

(NOT FOR DISTRIBUTION)

(This draft document is designed for review by the Advisory Board on Teacher Education and Licensure on April 15, 1996)

TECHNOLOGY STANDARDS FOR INSTRUCTIONAL PERSONNEL

INTRODUCTION

In September 1995, the Board or Education requested the Advisory Board on Teacher Education and Licensure (ABTEL) to address the issue of technology proficiencies as a requirement for licensure of instructional personnel. The proficiencies should be based on the revised Standards of Learning, which require technology standards that are Incorporated in each core discipline to be mastered by students by the end of the fifth and eighth grade levels as well as local school division standards and national efforts in this area.

A task force was organized to develop a proposal for technology standards and training of instructional personnel for consideration by the Advisory Board on Teacher Education and Licensure. This task force included representatives from the Advisory Board on Teacher Education and Licensure (ABTEL). The Association of Teacher Educators in Virginia (ATEVA), Virginia Association of Colleges for Teacher Education (VACTE), Virginia Educational Technology Advisory Committee (VETAC), and Department of Education staff members.

The task force quickly realized that inequities exist in the ability of schools to provide instruction to enable students to use technology for effective problem solving and productivity. These inequities can be traced to two main causes: the lack of access to adequate equipment arid. the lack of training for teachers. The International Society for Technology in Education (ISTE) noted that: "If technology is to become an integrated component of the educariona1 process of our schools. it must first become an essential part of America's teacher preparation programs." The International Society for Technology in Education has established guidelines for teacher preparation. The guidelines were approved by the National Council for

Accreditation of Teacher Education (NCATE) as standards by which technology education programs for teachers are evaluated.

The task force began its process of developing a proposal for state standards by reviewing the ISTE national standards relating to teacher competencies. In addition, teacher competencies in technology skills and educational applications, as identified by local education agencies in Virginia and other selected states, were reviewed and analyzed. The results of this analysis and review by the task force produced eight standards and selected examples or competencies to be used at the pre- and in-service levels. In addition, the task force made suggestions for determining proficiency of technology standards for instructional personnel and the procedure for reporting verification of obtaining the proficiency level for license renewal.

TECHNOLOGY STANDARDS AND SELECTED EXAMPLE COMPETENCIES

The task force identified technology, standards and examples of competencies for each of the eight standards for teacher licensure. These standards and the selected examples must be incorporated in local school divisions' technology plans and approved programs in institutions of higher education. As technology changes, the knowledge and skills required for instructional personnel in this area will change; therefore, the standards and the examples of competencies are flexible and open to revision as needed.

The examples, which provide further clarification of the standards, are offered to local school divisions and institutions of higher education with teacher preparation programs to provide assistance in developing implementation plans based on the standards. These examples may also be used as a resource when planning specific pre- and in-service training opportunities, including locally designed workshops, course work, independent study, and other programs in educational technology and its applications within the curriculum.

For each of the eight standards, examples of competencies are provided that could be included for mastery of a proficiency area. [Refer to Appendix I.] The sample enablers are not an inclusive list of possible applications and should not be used as a check list of required competencies for licensure purposes. The sample enablers are provided only for guidance in establishing local competency requirements and in developing local programs to assess applications of the standards.

PROFICIENCY IN TECHNOLOGY STANDARDS

The task force recommended that the assessment of instructional personnel's proficiency in the technology standards will be determined at the local school division level. School divisions should immediately incorporate these standards in their divisionwide technology plan and develop strategies to implement and assess the standards. The examples of the competencies provided are intended to be entry level; therefore, school divisions and teacher education institutions must establish provisions for pre- and in-service instructional personnel with higher levels of knowledge and skills to test out of the entry-level requirements.

Documentation of the proficiency in technology standards for in-service instructional personnel will be submitted to the Department of Education through the license renewal process. Pre-service candidates will submit documentation of proficiency of the standards as part of the approved-program process.

PROCEDURE

The Advisory Board on Teacher Education and Licensure will present the technology standards for pre- and in-service training to the Board of Education in May 1996. Upon the approval of the standards by the Board of Education, the standards will be subject to the Administrative Process Act.

School divisions and institutions of higher education Will be given one full year *to* incorporate the standards into the divisionwide technology plan and into approved programs respectively. School divisions and institutions of higher education will also need to develop implementation plans for pre- and in-service training for instructional personnel.

Virginia requires that instructional personnel must earn at least 180 professional development points every five years to renew their licenses. License holders without a master's degree must earn three semester hours of course work in their content area. The regulations allow division superintendents to make exceptions to the content requirement. The school division could include in its technology plan an option whereby license holders may apply a course addressing the eight technology standards in lieu of the content course.

Local school divisions submitting renewal requests must attest that license holders have met the technology standards. The format for the request for renewal would be revised so school divisions can certify by the superintendent's or designee's signature that the license holder has met the technology standards. The verification form for colleges and universities to document individuals' completion of approved programs would also be revised so officials may certify students' proficiency in the technology standards.

TECHNOLOGY STANDARDS

"To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and *use effectively the needed information. Ultimately, information-literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information. and how to use information in such a way that others can learn from them. They' are people prepared for lifelong learning, because they can always find the information needed for any task: or decision."*

The following standards are recommended by the Technology Task Force as the licensure requirement for instructional personnel:

1. Operate a computer system and utilize software. [Sample enablers: use a variety of computer system input/output devices and peripherals; store, organize, and retrieve software programs and date files on a variety of storage devices; navigate different types of software programs including instructional productivity, application tools, and courseware; troubleshoot general hardware and software problems.]

Rationale: It is expected that by the year 2000, all classrooms in Virginia schools will have at least one microcomputer for teacher and student use.

In the "information age," the need to operate a microcomputer and utilize basic software should be as much a part of the daily routine for instructional personnel as it is for most of the business world.

2. Apply knowledge of terms associated with educational computing and technology. [Sample enablers: apply functional knowledge of basic microcomputer components. e.g., operating, application, and utility software: permanent and removable storage (main memory, hard drive, and optical or magnetic disc): monitor; scanner and digital camera:; matrix, inkjet, and laser printers; apply functional knowledge of various technology tools, e.g., video records and players. optical disc players. computer presentation devices, multimedia computer work station.]

Rationale: Educators need a common vocabulary and a functional understanding of educational technologies.

3. Apply productivity tools for professional use. [Sample enablers: use technology for student assessment; use software tools to assist with classroom administrative tasks; use

software tools to design, customize, or individualize instructional materials; use software to enhance communication with students, parents, and community: use telecommunications software to collaborate and find resource materials.]

Rationale: The use of basic productivity software to aid with student assessment, records and correspondence management, and instructional materials development can be effective and time efficient. Educators should be able to model how technology can be used to enhance learning and job performance.

4. Use electronic technologies to access and exchange information. [Sample enablers: use local and worldwide telecommunications: use search strategies to retrieve electronic information.]

Rationale: An understanding of how to search for. organize, and present information using modern media is becoming a common workplace and learning skill. State and national technology initiatives are moving toward local area networks for all schools. These networks are connected to state, national, and international networks. Educators must know how to access networks and to exchange and/or retrieve information for both teaching and professional development.

5. **Identify, locate, evaluate, and use appropriate instructional technology-based resources (hardware and software) to support Standards of Learning and other instructional objectives.** [Sample enablers: understand types, characteristics, sources, and use of effective instructional software and other technology-based learning resources; use tools of technology including, but not limited to, computers, modems, networks, printers, large group presentation devices, scanners, digital cameras, camcorders, video cassette recorders, optical disc players, etc.]

Rationale: Educators need to utilize effectively all available resources, both traditional and technology-based, and be able to use these resources to assist students in accomplishing the Standards of Learning.

6. Use educational technologies for data collection, information management, problem solving, decision making, communications, and presentations within the curriculum. [Sample enablers: incorporate word processing, spreadsheet, or database software into instruction; incorporate telecommunications as a component of instruction; and use a presentation and/or authoring program to present a lesson or develop instructional materials.]

Rationale: Many modern jobs will require the skills that are mentioned in this standard. Students will need learning experiences that help them become life-long learners with the ability to function in these areas regardless of their eventual work or educational environment. Therefore, teachers must develop and model skills in the use of technology in order to offer students appropriate learning experiences.

7. Plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings. [Sample enablers: utilize technology to facilitate student-centered instruction as determined by the discipline and/or grade level taught; use multimedia, hypermedia, and telecommunications software to support individual and/or small group instruction; as teaching assignments dictate, utilize and/or understand resources available concerning adaptive technology; use technology effectively in various educational settings, e.g., one computer in a classroom, class-size computer lab, computers in classroom clusters or mini labs, multimedia computer work stations, integrated learning systems (ILS); effectively utilize an automated library media center.]

Rationale: Educators strive to be responsive to the individual needs and learning styles of a diverse group of students. Technology-based resources can be used to meet these diverse needs in a variety of classroom and laboratory settings.

8. **Demonstrate knowledge of ethical and legal issues relating to the use of technology.** [Sample enablers: abide by copyright laws, practice responsible uses of technology.]

Rationale: Educators using instructional technology serve as models for students. They must have a basic understanding of the complex issues regarding the legal and ethical uses of technology.

Appendix B

Student Computer Survey

Please read the following questions and place your responses on the blue answer sheet. All responses are confidential and will be used to improve the quality of computer instruction at UW-Stout.

Basic Computer Skills

Are you able to:

1. Turn on/off a computer, monitor and printer	A. Yes	B. No	C. Unsure
2. Use the Windows operating system	A. Yes	B. No	C. Unsure
3. Use DOS commands	A. Yes	B. No	C. Unsure
4. Use the Macintosh operating system	A. Yes	B. No	C. Unsure
5. Format a floppy disk	A. Yes	B. No	C. Unsure
6. Start a software program	A. Yes	B. No	C. Unsure
7. Copy files	A. Yes	B. No	C. Unsure
8. Manage a hard drive (using folders/directories)	A. Yes	B. No	C. Unsure
9. Set up a new personal computer (from box)	A. Yes	B. No	C. Unsure
10. Install new software on a computer	A. Yes	B. No	C. Unsure
11. Teach yourself a new software program	A. Yes	B. No	C. Unsure
12. Set up a computer network	A. Yes	B. No	C. Unsure

Word Processing Skills

Using a word processing software program (such as WordPerfect), are you able to create:

13. A business letter	A. Yes	B. No	C. Unsure
14. A research paper or proposal	A. Yes	B. No	C. Unsure
15. A resume	A. Yes	B. No	C. Unsure
16. A mail merge (for form letters, mailing labels)	A. Yes	B. No	C. Unsure
17. An outline	A. Yes	B. No	C. Unsure
18. A newsletter	A. Yes	B. No	C. Unsure
19. A brochure or complex publication	A. Yes	B. No	C. Unsure

Spreadsheet Skills

Using a spreadsheet software package (such as Lotus 1-2-3), can you:

20. Enter data into an existing spreadsheet	A. Yes	B. No	C. Unsure
21. Create a new spreadsheet	A. Yes	B. No	C. Unsure
22. Create functions and formulas for a spreadsheet	A. Yes	B. No	C. Unsure
23. Create charts and graphs from spreadsheet data	A. Yes	B. No	C. Unsure
24. Create macros for a spreadsheet	A. Yes	B. No	C. Unsure
25. Use database functions (e.g. sort, query)	A. Yes	B. No	C. Unsure

Database Skills

Using a database software package (such as dBase), can you:

26. Enter data into an existing database	A. Yes	B. No	C. Unsure
27. Create a new database	A. Yes	B. No	C. Unsure
28. Create functions and formulas for a database	A. Yes	B. No	C. Unsure
29. Create a database report	A. Yes	B. No	C. Unsure
30. Sort and query a database	A. Yes	B. No	C. Unsure
31. Use indexes and views to link databases	A. Yes	B. No	C. Unsure
32. Do database programming	A. Yes	B. No	C. Unsure

Graphics/Multimedia Skills

Using a graphics software package (such as Harvard Graphics), can you:

33. Draw simple shapes and objects	A. Yes	B. No	C. Unsure
34. Use clip art	A. Yes	B. No	C. Unsure
35. Draw complex objects and create illustrations	A. Yes	B. No	C. Unsure
36. Create charts, graphs, diagrams and flowcharts	A. Yes	B. No	C. Unsure
37. Create presentation materials (overheads)	A. Yes	B. No	C. Unsure
38. Create a multimedia presentation	A. Yes	B. No	C. Unsure

Information Retrieval/Telecommunications

Using information retrieval resources and telecommunications software, can you:

39. Send and receive electronic mail	A. Yes	B. No	C. Unsure
40. Use electronic databases (PUBCAT, ERIC)	A. Yes	B. No	C. Unsure
41. Use an electronic bulletin board	A. Yes	B. No	C. Unsure
42. Locate and retrieve information over Internet	A. Yes	B. No	C. Unsure
43. Set up a computer conference	A. Yes	B. No	C. Unsure

Programming

44. Do you have computer programming skills? A. Yes B. No C. Unsure

Please list below the computer programming languages that you can use:

_____

Other Computer Skills

45. Do you have any other computer skills or know how to use other types of computer programs?
A. Yes B. No C. Unsure

Please list or explain in the space below.

_____

_____

46. Where did you obtain your computer skills?

a. high school courses
b. UW-Stout courses
c. through your work experiences
d. at home
e. other (please list) _____

47. How important is it to have computer skills to obtain employment in your chosen major?

a. it is essential
b. it is very important
c. it is somewhat important
d. it is not important
e. unsure

Student Information

Please complete the following:

48. Year in School a. Freshman b. Sophomore c. Junior d. Senior

49. Gender a. Female b. Male

Program/Career Area *(choose one in either 50 or 51)*

50. a. Business b Education c. Industrial Technology d. Retail e. Hospitality

51. a. Human Services b. Art/Design c. Food/Dietetics d. Math/Engineering e. Other (list)_____

52. Do you own a computer? a. Yes (IBM) b. Yes (Mac) c. Yes (other brand) d. No

Thank you for completing this survey. Please return this survey to your instructor.

NOTE: You understand that by returning this questionnaire, you are giving informed consent as a participating volunteer in this study. You also understand the basic nature of the study and agree that any potential risks are exceedingly small. You also realize that potential benefits may be realized from the completion of the study. You are also aware that the information is being sought in a specific manner so that no identifiers are needed and so that confidentiality is guaranteed. You realize that you have the right to refuse to participate and that you have the right to withdraw from participation at any time during the study. This right will be respected with no coercion or prejudice. Questions or concerns about participation in the research or subsequent complaints should be addressed first to the researcher and second to Dr. Ted Knous, Chair, UW-Stout Institutional Review Board for the Protection of Human Subjects in Research, 410 BH, UW-Stout, Menomonie, WI 54751.

Appendix C

SURVEY FOR TECHNOLOGY STAFF DEVELOPMENT

In preparation for the Secondary Computer Initiative, information about your need for training in the use of the technology is required. It is imperative that you be honest in your responses so the training will be beneficial for you. Your name, school and grade level are requested only to be able to schedule appropriate classes and notify you.

Relicensure points will be provided for all training.

Indicate your responses to the following questions on the accompanying ASSESSMENT ANSWER SHEET. Use a regular pencil (#2) and make dark marks.

*Please grid your name in the space for **STUDENT LAST NAME AND FIRST NAME.** In the space for SCH #, grid in the 3-digit number of your school. Since this information will be integrated with your record of staff development, please grid your social security number in the first 9 spaces under **STUDENT NUMBER.** Leave blank the spaces for teacher name and course codes.*

*Starting at **BEGIN HERE** on your answer sheet, mark all of your answers to the following items by filling in the circle of the letter of your answer*

Training will occur during the regular school day. Consideration is being given to the possibility of Saturday training as well as training during Spring Break. Please indicate your willingness to attend training on Saturdays or during Spring Break.

1. Saturday technology training
   - Available for training — A
   - Not available for training — B
2. Spring Break technology training
   - Available for training — A
   - Not available for training — B

Please mark the choice that best represents your experience/knowledge of each type of computer program or each set of applications below.

	Use computer for individual purposes	*Use computer for individual purposes and occasionally with students*	*Frequently use computer and other technology in new and innovative lessons*
Nonuser A	*Beginner* B	*Intermediate* C	*Expert* D

Types of computers/applications:

3. Word Processor (MS Works, MS Word, WordPerfect, other)
4. Presentation/Multi Media/HyperStudio/PowerPoint
5. Data Base (MS Works, Access, other)
6. Spreadsheet (MS Works, Excel, other)
7. Information retrieval
8. Quick Mail
9. Any other electronic online service (Kidsnet, Prodigy, VaPen, America On Line, etc.)
10. CD ROMs specifically related to your subject area.
11. Laser Video Disc specifically related to your subject area.
12. Peripheral equipment (digital cameras, scanners, barcode readers, probes, other)
13. Overall, what is your level of proficiency on the computer?
14. With which computer are you most familiar and proficient?
    - Macintosh — A
    - DOS/WIN — B
    - Both — C
    - Neither — D

Please locate in the following list the subject area for the 96-97 school year for which you are responsible. When you find it, bubble in the A on the answer sheet for the number which appears next to your subject area. Do so for as many subjects/assignments as apply.

15. Advanced English
16. English 6
17. English 7
18. English 8
19. English 9
20. English 10
21. English 11
22. English 12
23. Math 1
24. Math 2
25. Math 3
26. Algebra I
27. Algebra 2
28. Advanced Alg/Trig.
29. Math Analysis/Trig
30. Statistics/Discrete Topics
31. Consumer Math
32. Calculus
33. Geometry
34. Trigonometry
35. Science 6
36. Life Science 7
37. Physical Science 8
38. Earth & Space Sc.
39. Biology
40. Chemistry
41. Physics
42. Social Studies
43. World History
44. U S History
45. Civics
46. Western Civ.
47. Global Studies
48. Government
49. Psychology
50. Economics
51. Sociology
52. Reading
53. Gifted
54. Computer Contact
55. Special Education
56. EH
57. SPH
58. TMR
59. Art
60. Music
61. Health & PE Education
62. French
63. Russian
64. Japanese
65. ESL
66. Spanish
67. German
68. Latin
69. Business Ed
70. Marketing
71. Driver Education
72. T & I Studies
73. Technology Ed
74. Work & Family Studies
75. Ed for Employment
76. ROTC
77. Librarian
78. Principal
79. Assistant Principal
80. Activity Director
81. Instructional Assistants
82. Guidance Counselor
83. Other _____

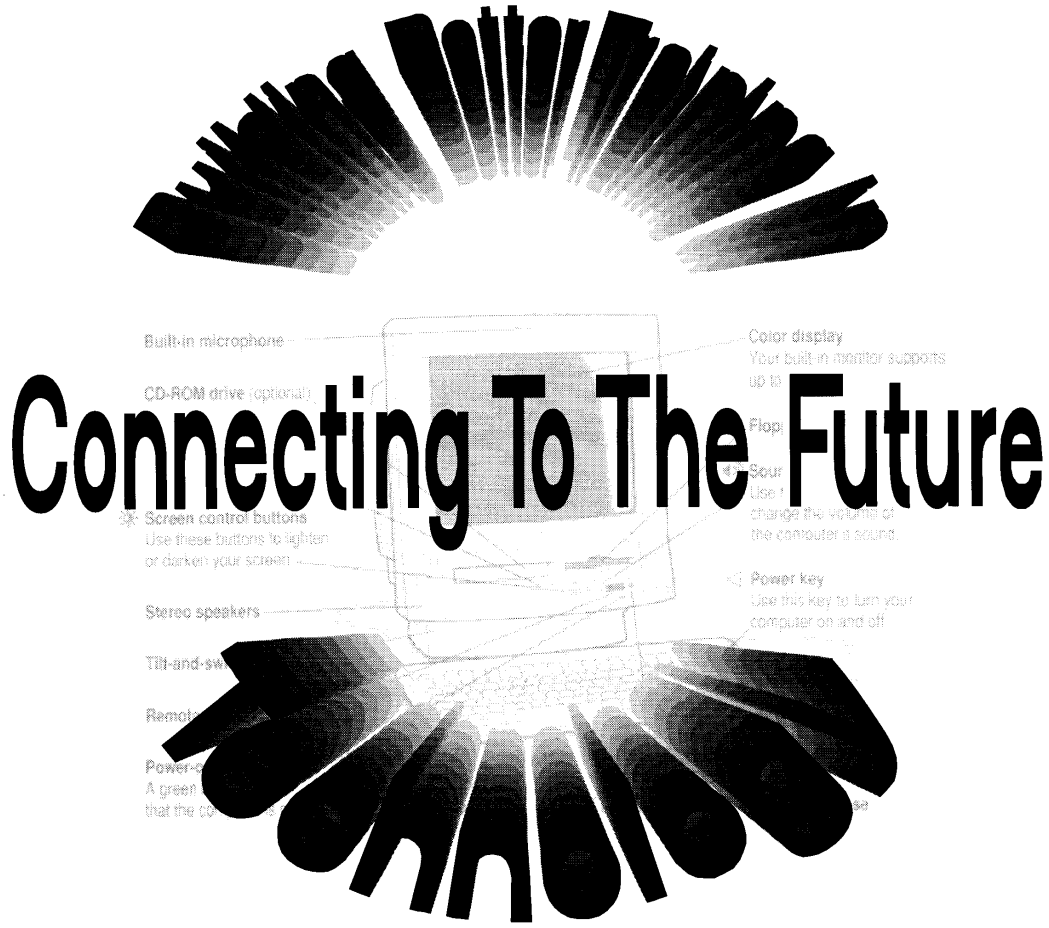
84. Please indicate whether you are a full-time or part-time employee:

Full-time	Part-time
A	B

If you have questions/comments about items in this survey, you may write them on a separate sheet of paper and include them with your answer sheet. If someone needs to respond to your questions, be sure to include your name and school with comments.

Thank you for your time in completing the survey. It will allow for training to be scheduled in a more efficient manner.

Appendix D



Connecting To The Future

A Survey of Professional Needs
in the
Area of Technology ©

Gloucester County Public Schools
Gloucester, VA

***J. Larry Hoover*, Superintendent of Schools**

SELF-EVALUATION OF TECHNOLOGY PROFICIENCY
GLOUCESTER COUNTY PUBLIC SCHOOLS

The Virginia Board of Education is considering eight (8) Technology Standards for Instructional Personnel. As an aid to planning staff development in the division, it is imperative that instructional personnel assess their current technology proficiency accurately.

In responding to the questions 1 and 2, ONLY one response is needed for either question. Please completely fill only one circle on the accompanying scan sheet that best defines your instructional assignment from the ten possible choices. Only one response is desired in answering questions 1 and 2.

1. A. K-2 Regular Primary Teacher
   B. 3-5 Regular Elementary Teacher
   C. K-8 Resource Teacher (Art, Music, P.E.)
   D. K-12 Special Education Teacher
   E. 6-8 Regular Middle School Teacher

2. A. High School English or Social Studies Teacher
   B. High School Math or Science Teacher
   C. Fine Arts or Vocational Teacher
   D. Other High School Teacher
   E. Non-Teaching Instructional Staff (Admin., Guidance, Librarian)

DIRECTIONS:	On the scan sheet provided, please fill the circle completely that corresponds to your answer according to the rating system below.
A) YES	My response to this statement is "yes".
B) NO	My response to this statement is "no".
C) UNSURE	My response to this statement is "unsure".

Operating a computer system and utilizing software

	I can:
ABC	3. Turn on a computer, including its peripherals.
ABC	4. Shut down the computer properly.
ABC	5. Eject a diskette.
ABC	6. Format a blank diskette.
ABC	7. Save files to the hard disk drive.
ABC	8. Save files to a floppy disk.
ABC	9. Copy files from the hard disk drive to a diskette.
ABC	10. Copy files from a floppy diskette to the hard disk drive.
ABC	11. Delete data from a diskette.
ABC	12. Delete data from the computer's hard disk drive.
ABC	13. Delete software from a diskette.
ABC	14. Delete software from the computer's hard disk drive.
ABC	15. Use manuals to install software onto the computer's hard disk drive.
ABC	16. Use manuals to connect peripheral devices to a computer.
ABC	17. Determine the amount of RAM installed in the computer.
ABC	18. Determine the storage space available on the hard disk drive.
ABC	19. Assemble the components of a computer according to packaged directions.

DIRECTIONS:	On the scan sheet provided, please fill the circle completely that corresponds to your answer according to the rating system below.
A) YES	My response to this statement is "yes".
B) NO	My response to this statement is "no".
C) UNSURE	My response to this statement is "unsure".

Applying knowledge of terms associated with educational computing and technology

	I understand the meaning of the following:
	Hardware terms:
ABC	20. CPU.
ABC	21. Monitor.
ABC	22. Keyboard.
ABC	23. Diskette.
ABC	24. Hard Drive.
ABC	25. Mouse.
ABC	26. Memory.
ABC	27. Bytes.
ABC	28. CD-ROM.
ABC	29. Modem.
ABC	30. RAM.
ABC	31. External Disk Drive.
ABC	32. External Port.
ABC	33. Parallel Printer.
ABC	34. Serial Printer.
ABC	35. Parallel Cable.
ABC	36. Serial Cable.
ABC	37. Modem Cable.
ABC	38. Peripherals.
ABC	39. SCSI.
ABC	40. Scanner.
ABC	41. LCD Panel.
ABC	42. Digital Camera.
ABC	43. SCSI Cable.
ABC	44. Video Projector.
ABC	45. Laser Disc Player.
ABC	46. Input-Output Device.

DIRECTIONS:	On the scan sheet provided, please fill the circle completely that corresponds to your answer according to the rating system below.
A) YES	My response to this statement is "yes".
B) NO	My response to this statement is "no".
C) UNSURE	My response to this statement is "unsure".

	I understand the meaning of the following:
	Software terms:
ABC	47. Boot.
ABC	48. Cursor.
ABC	49. Double or Single Click.
ABC	50. Drag.
ABC	51. Open and Close.
ABC	52. Shut down.
ABC	53. Trash.
ABC	54. Delete.
ABC	55. Icon.
ABC	56. Desktop.
ABC	57. Folders and Files.
ABC	58. Font.
ABC	59. Directories.
ABC	60. Format or Initialize.
ABC	61. Application program.
ABC	62. Operating System.
ABC	63. Load or Install.
ABC	64. Setup.
ABC	65. Backup.
ABC	66. Utility Program.
ABC	67. OCR.
ABC	68. Put away.

DIRECTIONS:	On the scan sheet provided, please fill the circle completely that corresponds to your answer according to the rating system below.
A) YES	My response to this statement is "yes".
B) NO	My response to this statement is "no".
C) UNSURE	My response to this statement is "unsure".

Demonstrating knowledge of ethical and legal issues relating to the use of technology

	I can model:
A B C	69. An understanding of applicable copyright laws when using technology.
A B C	70. Responsible use of licensed software.
A B C	71. Responsible use of Internet resources for educational purposes.
A B C	72. Responsible use of computer hardware.

DIRECTIONS:	On the scan sheet provided, please fill the circle completely that corresponds to your answer according to the rating system below.
A) NON-USER	I am not able to use this skill(s).
B) BEGINNER	I am beginning to use this skill(s) for personal use.
C) USER	I can use this skill(s) to accomplish a simple task.
D) ADVANCED	I have mastered this skill(s) and can use it in complex applications.
E) INSTRUCTOR	I can use skill(s) to instruct or guide others.

Applying productivity tools for professional use

	I can:
ABCDE	73. Use software to perform administrative tasks required by my position, such as maintaining attendance records or completing reports.
ABCDE	74. Use word-processing software to prepare working papers as required by my position.
ABCDE	75. Use spreadsheet software to calculate students' grades.
ABCDE	76. Use database software to access student information.
ABCDE	77. Use database software for reporting student information.
ABCDE	78. Use word processing software to prepare communications with students, parents, and the community.
ABCDE	79. Use software to prepare newsletters to communicate with students, parents, and the community.
ABCDE	80. Use software to design overhead slides for use with a lesson.
ABCDE	81. Use software to design motivational graphic handouts for use with a lesson.
ABCDE	82. Use software to design worksheets for use with a lesson.
ABCDE	83. Use software to design tests for use with a lesson.
ABCDE	84. Use telecommunications software to access resource materials, such as email.
ABCDE	85. Use telecommunications software to access Internet sites.
ABCDE	86. Use telecommunications software to access voice mail.
ABCDE	87. Use telecommunications software to send a fax.

DIRECTIONS: On the scan sheet provided, please fill the circle completely that corresponds to your answer according to the rating system below.

A) NON-USER	I am not able to use this skill(s).
B) BEGINNER	I am beginning to use this skill(s) for personal use.
C) USER	I can use this skill(s) to accomplish a simple task.
D) ADVANCED	I have mastered this skill(s) and can use it in complex applications.
E) INSTRUCTOR	I can use skill(s) to instruct or guide others.

Using electronic technologies to access and exchange information

	I can:
ABCDE	88. Access dial-up services, such as: VAPEN, Prodigy, CompuServe, America-On-Line, or other Internet service providers.
ABCDE	89. Use an Internet browser, such as Netscape.
ABCDE	90. Effectively use an e-mail account.
ABCDE	91. Research information on the Internet using search engines, such as Lycos and Yahoo.
ABCDE	92. Use electronic encyclopedias to locate relevant information.
ABCDE	93. Use electronic almanacs to locate relevant information.
ABCDE	94. Use electronic indexes to find information.
ABCDE	95. Use electronic catalogs to find information.

DIRECTIONS:	On the scan sheet provided, please fill the circle completely that corresponds to your answer according to the rating system below.
A) NON-USER	I am not able to use this skill(s).
B) BEGINNER	I am beginning to use this skill(s) for personal use.
C) USER	I can use this skill(s) to accomplish a simple task.
D) ADVANCED	I have mastered this skill(s) and can use it in complex applications.
E) INSTRUCTOR	I can use skill(s) to instruct or guide others.

Identifying, locating, evaluating, and using appropriate instructional technology-based /resources (hardware and software) to support standards of learning and other instructional objectives

	I can:
ABCDE	96. Use the electronic resources available in a school media center.
ABCDE	97. Use the electronic resources available in a modern library.
ABCDE	98. Evaluate relevant software for purchase for use with computers in the classroom.
ABCDE	99. Use software that is designed for "Drill & Practice" with computers in the classroom.
ABCDE	100. Use software specifically designed to supplement instruction, such as: Integrated Learning ystems, Windows on Science, Writing Skills with computers in the classroom.
ABCDE	101. Use voice technologies in conducting lessons that specifically address SOL'S, such as audio cassettes.
ABCDE	102. Use data technologies in conducting lessons that specifically address SOL'S, such as a personal computer (PC).
ABCDE	103. Use video technologies in conducting lessons that specifically address SOL'S, such as video cassettes and discs.

DIRECTIONS:	On the scan sheet provided, please fill the circle completely that corresponds to your answer according to the rating system below.
A) NON-USER	I am not able to use this skill(s).
B) BEGINNER	I am beginning to use this skill(s) for personal use.
C) USER	I can use this skill(s) to accomplish a simple task.
D) ADVANCED	I have mastered this skill(s) and can use it in complex applications.
E) INSTRUCTOR	I can use skill(s) to instruct or guide others.

Using educational technologies for data collection, information management, problem solving, decision making, communications, and presentations within the curriculum

	I can:
ABCDE	104. Model the use of word-processing for my students.
ABCDE	105. Model the use of spreadsheets for my students.
ABCDE	106. Model the use of database software for my students.
ABCDE	107. Model the use of telecommunications (Internet or on-line services) as a component of instruction for my students.
ABCDE	108. Model multi-media presentations to prepare instructional projects for my students.
ABCDE	109. Engage students in using word-processing software as a part of a lesson.
ABCDE	110. Engage students in using spreadsheets as a part of a lesson.
ABCDE	111. Engage students in using database software as a part of a lesson.
ABCDE	112. Engage students in my classroom in using telecommunications (Internet or on-line services) as a part of a lesson.
ABCDE	113. Engage students in my classroom in using multi-media presentations as a part of their lessons.

DIRECTIONS:	On the scan sheet provided, please fill the circle completely that corresponds to your answer according to the rating system below.
A) NON-USER	I am not able to use this skill(s).
B) BEGINNER	I am beginning to use this skill(s) for personal use.
C) USER	I can use this skill(s) to accomplish a simple task.
D) ADVANCED	I have mastered this skill(s) and can use it in complex applications.
E) INSTRUCTOR	I can use skill(s) to instruct or guide others.

Planning and implementing lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings

	I can conduct a lesson that:
A B C D E	114. Utilizes computer technology to place the student at the center of instruction.
A B C D E	115. Has students use multimedia to support their learning.
A B C D E	116. Has students use hypermedia to support their learning.
A B C D E	117. Has students use telecommunications software to support their learning.
A B C D E	118. Incorporates the use of adaptive technologies.
A B C D E	119. Utilizes a single computer in the classroom, if that is the technology available.
A B C D E	120. Utilizes computers for every student, if that is the technology available.
A B C D E	121. Utilizes a class size computer lab, if that is the technology available.
A B C D E	122. Utilizes computers in a classroom cluster or mini-lab, if that is the technology available.
A B C D E	123. Utilizes a multi-media work station, if that is the technology available.
A B C D E	124. Utilizes an Integrated Learning System (ILS), if that is the technology available.
A B C D E	125. Makes use of graphing calculators in lesson activities in appropriate classes.
A B C D E	126. Makes use of scientific probes in lesson activities in appropriate classes.
A B C D E	127. Effectively utilizes an automated library media center

Appendix E

Pilot Technology Training Program

	Monday	Tuesday	Wednesday	Thursday
9:00 AM	Introduction / Objectives	Assignment #1 Letterhead Stationery	Spreadsheet Instruction	Slide show demo (4 shows)
9:15 AM	Computer terms	(Save as stationery)	Grade Book	Slide Show Assts.
9:30 AM		Database Intro	calculation	Lora-B&W Overheads
9:45 AM	Sticker Activity (PD 1)	Terms, create activity		
10:00 AM	Mac Basics	5 records	chart	Slide Show
	nomenclature matching (Pilot doc. 2)	Search		(Wendy)
10:15 AM	troubleshooting			
10:30 AM	break	break	break	break
10:45 AM	Review nec. terms	Layout	Spreadsheet	Slide Show
11:00 AM	Mac Basic Activity		calendar	add sounds and movies
11:15 AM	Pilot document 3	Mail Merge	or	
11:30 AM			worksheet	INTERNET
11:45 AM				
12:00 - 1:00 PM	Lunch	Lunch	Lunch	Lunch
1:00 PM	Claris Intro	Create applicable DB	Spreadsheet Activity	INTERNET
1:15 PM	Window terminology	min. 5 records	Mad Minute	
1:30 PM	req. skills for #4 & #5	min. 5 fields		
1:45 PM	Pilot document #4	personal stationery	Spreadsheet Activity	
2:00 PM	Pilot document #5	5 mail merges	Household Budget	
2:15 PM	combined skills	Drawing Instruction	calculate	Newsletter
2:30 PM	header, footer, page no., margins		and print	
2:45 PM	break	break	break	break
3:00 PM	"Notice" demonstration	Select:	Select:	Typography
3:15 PM	"Notice" practice	Brochure	Typography	assignment
3:30 PM	Pilot document 6	Certificate	assignment	Assessment Survey
3:45 PM		Outlining	Newsletter	
4:00 PM		Transparencies	Transparencies	

Appendix F

Table 12

Number of Respondents and Percentage of Pilot Participants by Level of Proficiency on Standard #1.

	Before Staff Development				After Staff Development			
Indicator	**Total Responses**	Yes	No	Unsure	**Total Responses**	Yes	No	Unsure
3	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
4	15	93.3%	0.0%	6.7%	12	100.0%	0.0%	0.0%
5	15	93.3%	0.0%	6.7%	12	100.0%	0.0%	0.0%
6	15	80.0%	13.3%	6.7%	12	100.0%	0.0%	0.0%
7	15	93.3%	0.0%	6.7%	12	100.0%	0.0%	0.0%
8	15	93.3%	0.0%	6.7%	12	100.0%	0.0%	0.0%
9	15	66.7%	20.0%	13.3%	12	100.0%	0.0%	0.0%
10	15	66.7%	20.0%	13.3%	12	100.0%	0.0%	0.0%
11	15	86.7%	13.3%	0.0%	12	100.0%	0.0%	0.0%
12	15	86.7%	13.3%	0.0%	12	100.0%	0.0%	0.0%
13	15	66.7%	13.3%	20.0%	12	100.0%	0.0%	8.3%
14	15	66.7%	13.3%	20.0%	12	100.0%	0.0%	0.0%
15	15	60.0%	26.7%	13.3%	12	100.0%	0.0%	16.7%
16	15	60.0%	26.7%	13.3%	12	100.0%	0.0%	0.0%
17	15	46.7%	40.0%	13.3%	12	100.0%	0.0%	0.0%
18	15	66.7%	26.7%	6.7%	12	100.0%	0.0%	0.0%
19	15	66.7%	20.0%	13.3%	12	91.7%	0.0%	8.3%

Table 13

Number of Respondents and Percentage of Pilot Participants by Level of Proficiency on Standard #2 (Hardware).

	Before Staff Development				After Staff Development			
Indicator	**Total Responses**	Yes	No	Unsure	**Total Responses**	Yes	No	Unsure
20	15	73.3%	20.0%	6.7%	12	100.0%	0.0%	0.0%
21	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
22	15	93.3%	0.0%	0.0%	12	100.0%	0.0%	0.0%
23	15	100.0%	6.7%	0.0%	12	100.0%	0.0%	0.0%
24	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
25	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
26	15	60.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
27	15	60.0%	20.0%	20.0%	12	100.0%	0.0%	0.0%
28	15	93.3%	0.0%	6.7%	12	100.0%	0.0%	0.0%
29	15	80.0%	0.0%	20.0%	12	100.0%	0.0%	0.0%
30	15	66.7%	20.0%	13.3%	12	100.0%	0.0%	0.0%
31	15	86.7%	13.3%	0.0%	12	100.0%	0.0%	0.0%
32	15	60.0%	40.0%	0.0%	12	91.7%	0.0%	8.3%
33	15	40.0%	40.0%	20.0%	12	91.7%	0.0%	0.0%
34	15	26.7%	46.7%	26.7%	12	91.7%	0.0%	0.0%
35	15	20.0%	53.3%	26.7%	12	91.7%	0.0%	0.0%
36	15	20.0%	53.3%	26.7%	12	91.7%	0.0%	0.0%
37	15	53.3%	33.3%	13.3%	12	91.7%	0.0%	0.0%
38	15	66.7%	26.7%	6.7%	12	100.0%	0.0%	0.0%
39	15	33.3%	53.3%	13.3%	12	100.0%	0.0%	0.0%
40	15	86.7%	13.3%	0.0%	12	100.0%	0.0%	0.0%
41	15	46.7%	46.7%	6.7%	12	100.0%	0.0%	0.0%
42	15	60.0%	33.3%	6.7%	12	100.0%	0.0%	0.0%
43	15	26.7%	73.3%	0.0%	12	100.0%	0.0%	0.0%
44	15	66.7%	20.0%	13.3%	12	100.0%	0.0%	0.0%
45	15	80.0%	13.3%	6.7%	12	100.0%	0.0%	0.0%
46	15	66.7%	20.0%	13.3%	12	91.7%	0.0%	8.3%

Table 14

Number of Respondents and Percentage of Pilot Participants by Level of Proficiency on Standard #2 (Software).

	Before Staff Development				After Staff Development			
Indicator	**Total Responses**	Yes	No	Unsure	**Total Responses**	Yes	No	Unsure
47	15	86.7%	0.0%	13.3%	12	100.0%	0.0%	0.0%
48	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
49	15	93.3%	6.7%	0.0%	12	100.0%	0.0%	0.0%
50	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
51	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
52	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
53	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
54	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
55	15	100.0%	0.0%	0.0%	12	100.0%	0.0%	0.0%
56	15	93.3%	0.0%	6.7%	12	100.0%	0.0%	0.0%
57	15	93.3%	6.7%	0.0%	12	100.0%	0.0%	0.0%
58	15	93.3%	0.0%	0.0%	12	100.0%	0.0%	0.0%
59	15	100.0%	6.7%	40.0%	12	100.0%	0.0%	8.3%
60	15	80.0%	0.0%	20.0%	12	100.0%	0.0%	0.0%
61	15	66.7%	26.7%	6.7%	12	91.7%	0.0%	8.3%
62	15	66.7%	20.0%	13.3%	12	91.7%	0.0%	8.3%
63	15	93.3%	0.0%	6.7%	12	100.0%	0.0%	0.0%
64	15	60.0%	20.0%	20.0%	12	91.7%	0.0%	8.3%
65	15	73.3%	6.7%	20.0%	12	91.7%	0.0%	8.3%
66	15	40.0%	40.0%	20.0%	12	75.0%	0.0%	25.0%
67	15	20.0%	60.0%	20.0%	12	75.0%	0.0%	25.0%
68	15	40.0%	40.0%	20.0%	12	100.0%	0.0%	0.0%
69	15	93.3%	0.0%	6.7%	12	91.7%	0.0%	8.3%
70	15	86.7%	0.0%	13.3%	12	91.7%	0.0%	8.3%
71	15	80.0%	0.0%	20.0%	12	91.7%	0.0%	8.3%
72	15	80.0%	0.0%	20.0%	12	91.7%	0.0%	8.3%

Table 15

Number of Respondents and Percentage of Pilot Participants by Level of Proficiency on Standard #4.

	Before Staff Development						After Staff Development					
Indicator	Total Responses	Non-User	Beginner	User	Advanced	Instructor	Total Responses	Non-User	Beginner	User	Advanced	Instructor
88	15	33.3%	46.7 %	20.0 %	0.0%	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%
89	15	6.7%	46.7 %	33.3 %	13.3 %	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%
90	15	6.7%	46.7 %	33.3 %	13.3 %	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%
91	15	20.0%	46.7 %	26.7 %	6.7%	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%
92	15	20.0%	40.0 %	40.0 %	0.0%	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%
93	15	26.7%	40.0 %	33.3 %	0.0%	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%
94	15	33.3%	46.7 %	20.0 %	0.0%	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%
95	15	26.7%	46.7 %	26.7 %	0.0%	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%

Table 16

Number of Respondents and Percentage of Pilot Participants by Level of Proficiency on Standard #5.

	Before Staff Development						**After Staff Development**					
Indicator	**Total Responses**	Non-User	Beginner	User	Advanced	Instructor	**Total Responses**	Non-User	Beginner	User	Advanced	Instructor
96	15	0.0%	46.7 %	53.3 %	0.0%	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%
97	15	20.0%	40.0 %	40.0 %	0.0%	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%
98	15	20.0%	46.7 %	26.7 %	6.7%	0.0%	12	8.3%	25.0 %	25.0 %	41.7 %	0.0%
99	15	20.0%	33.3 %	40.0 %	0.0%	6.7%	12	0.0%	8.3%	58.3 %	25.0 %	8.3%
100	15	33.3%	33.3 %	40.0 %	0.0%	0.0%	12	8.3%	16.7 %	66.7 %	16.7 %	0.0%
101	15	53.3%	6.7%	33.3 %	6.7%	0.0%	12	8.3%	0.0%	25.0 %	66.7 %	0.0%
102	15	40.0%	13.3 %	40.0 %	6.7%	0.0%	12	0.0%	8.3%	41.7 %	41.7 %	8.3%
103	15	60.0%	6.7%	26.7 %	6.7%	0.0%	12	8.3%	8.3%	41.7 %	41.7 %	0.0%

Table 17

Number of Respondents and Percentage of Pilot Participants by Level of Proficiency on Standard #6.

	Before Staff Development						After Staff Development					
Indicator	**Total Responses**	**Non-User**	**Beginner**	**User**	**Advanced**	**Instructor**	**Total Responses**	**Non-User**	**Beginner**	**User**	**Advanced**	**Instructor**
104	**15**	**13.3%**	**33.3%**	**40.0%**	**6.7%**	**6.7%**	**12**	**8.3%**	**0.0%**	**50.0%**	**33.3%**	**8.3%**
105	**15**	**53.3%**	**26.7%**	**13.3%**	**6.7%**	**0.0%**	**12**	**8.3%**	**16.7%**	**50.0%**	**16.7%**	**8.3%**
106	**15**	**46.7%**	**40.0%**	**6.7%**	**6.7%**	**0.0%**	**12**	**8.3%**	**8.3%**	**58.3%**	**16.7%**	**8.3%**
107	**15**	**33.3%**	**40.0%**	**20.0%**	**6.7%**	**0.0%**	**12**	**0.0%**	**33.3%**	**50.0%**	**16.7%**	**0.0%**
108	**15**	**46.7%**	**33.3%**	**20.0%**	**0.0%**	**0.0%**	**12**	**0.0%**	**41.7%**	**33.3%**	**25.0%**	**0.0%**
109	**15**	**33.3%**	**33.3%**	**20.0%**	**6.7%**	**6.7%**	**12**	**0.0%**	**0.0%**	**58.3%**	**33.3%**	**8.3%**
110	**15**	**60.0%**	**26.7%**	**13.3%**	**0.0%**	**0.0%**	**12**	**0.0%**	**25.0%**	**58.3%**	**8.3%**	**8.3%**
111	**15**	**53.3%**	**26.7%**	**20.0%**	**0.0%**	**0.0%**	**12**	**0.0%**	**25.0%**	**66.7%**	**0.0%**	**8.3%**
112	**15**	**46.7%**	**33.3%**	**13.3%**	**6.7%**	**0.0%**	**12**	**0.0%**	**33.3%**	**58.3%**	**8.3%**	**0.0%**
113	**15**	**66.7%**	**20.0%**	**6.7%**	**6.7%**	**0.0%**	**12**	**0.0%**	**33.3%**	**50.0%**	**16.7%**	**0.0%**

Table 18

Number of Respondents and Percentage of Pilot Participants by Level of Proficiency on Standard #7.

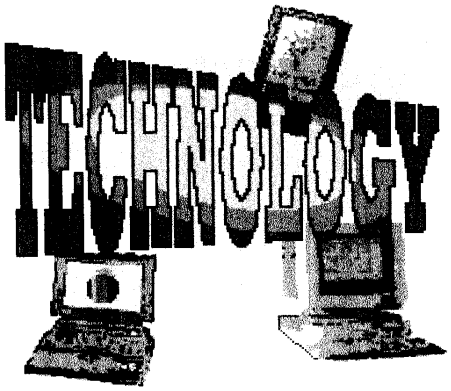
	Before Staff Development						After Staff Development					
Indicator	**Total Responses**	**Non-User**	**Beginner**	**User**	**Advanced**	**Instructor**	**Total Responses**	**Non-User**	**Beginner**	**User**	**Advanced**	**Instructor**
114	**15**	**40.0%**	**33.3%**	**20.0%**	**6.7%**	**0.0%**	**12**	**0.0%**	**16.7%**	**41.7%**	**33.3%**	**8.3%**
115	**15**	**60.0%**	**26.7%**	**13.3%**	**0.0%**	**0.0%**	**12**	**8.3%**	**8.3%**	**50.0%**	**33.3%**	**0.0%**
116	**15**	**60.0%**	**33.3%**	**6.7%**	**0.0%**	**0.0%**	**12**	**33.3%**	**25.0%**	**33.3%**	**8.3%**	**0.0%**
117	**15**	**46.7%**	**20.0%**	**33.3%**	**0.0%**	**0.0%**	**12**	**0.0%**	**41.7%**	**50.0%**	**8.3%**	**0.0%**
118	**15**	**60.0%**	**26.7%**	**13.3%**	**0.0%**	**0.0%**	**12**	**16.7%**	**25.0%**	**50.0%**	**8.3%**	**0.0%**
119	**15**	**13.3%**	**40.0%**	**40.0%**	**0.0%**	**6.7%**	**12**	**8.3%**	**0.0%**	**41.7%**	**41.7%**	**8.3%**
120	**15**	**26.7%**	**46.7%**	**13.3%**	**6.7%**	**6.7%**	**12**	**16.7%**	**16.7%**	**33.3%**	**25.0%**	**8.3%**
121	**15**	**26.7%**	**26.7%**	**26.7%**	**13.3%**	**6.7%**	**12**	**8.3%**	**16.7%**	**58.3%**	**8.3%**	**8.3%**
122	**15**	**46.7%**	**20.0%**	**20.0%**	**6.7%**	**6.7%**	**12**	**8.3%**	**33.3%**	**41.7%**	**8.3%**	**8.3%**
123	**15**	**73.3%**	**6.7%**	**20.0%**	**0.0%**	**0.0%**	**12**	**16.7%**	**41.7%**	**33.3%**	**8.3%**	**0.0%**
124	**15**	**73.3%**	**6.7%**	**13.3%**	**6.7%**	**0.0%**	**12**	**25.0%**	**33.3%**	**16.7%**	**16.7%**	**8.3%**
125	**15**	**73.3%**	**13.3%**	**13.3%**	**0.0%**	**0.0%**	**12**	**33.3%**	**41.7%**	**25.0%**	**0.0%**	**0.0%**
126	**15**	**86.7%**	**6.7%**	**6.7%**	**0.0%**	**0.0%**	**12**	**50.0%**	**16.7%**	**33.3%**	**0.0%**	**0.0%**
127	**15**	**33.3%**	**33.3%**	**33.3%**	**0.0%**	**0.0%**	**12**	**0.0%**	**25.0%**	**58.3%**	**16.7%**	**0.0%**

Table 19

Number of Respondents and Percentage of Pilot Participants by Level of Proficiency on Standard #8.

	Before Staff Development				After Staff Development			
Indicator	**Total Responses**	**Yes**	**No**	**Unsure**	**Total Responses**	**Yes**	**No**	**Unsure**
69	**15**	**93.3%**	**0.0%**	**6.7%**	**12**	**91.7 %**	**0.0%**	**8.3%**
70	**15**	**86.7%**	**0.0%**	**13.3 %**	**12**	**91.7 %**	**0.0%**	**8.3%**
71	**15**	**80.0%**	**0.0%**	**20.0 %**	**12**	**91.7 %**	**0.0%**	**8.3%**
72	**15**	**80.0%**	**0.0%**	**20.0 %**	**12**	**91.7 %**	**0.0%**	**8.3%**

Appendix G



ABTEL

TECHNOLOGY STANDARDS & ASSESSMENT COMPONENTS FOR INSTRUCTIONAL PERSONNEL

Gloucester County Public Schools
Superintendent J. Larry Hoover

ABTEL ASSESSMENT RECOMMENDATIONS

Std. No.	Statement	Enablers / Rationale	Indicators	Assessment	Portfolio
1	Operate a computer system and utilize software.	•Use various computer system input/output peripherals •Store , organize, and retrieve software programs and data files on a variety of storage devices •Use different types of software programs including instructional, productivity, application tools, and course ware •Troubleshoot general hardware and software problems _____ It is expected that by the year 2000, all classrooms in Virginia schools will have computers for teacher and student use. In the "information age," the need to operate a computer and utilize basic software should be as much a part of the daily routine for instructional personnel as it is for most of the business. world.	•Turn on and shut down a computer and its peripherals •Format or initialize a blank diskette •Insert and eject disks and CD-ROMS •Save files to hard disk drive, floppies, or removable storage devices •Copy files from a floppy to the hard drive and vice versa •Delete data from a floppy diskette and the hard disk drive •Remove or delete software from the hard disk drive •Use manuals and packaged instructions to assemble components of a computer and its peripherals •Use manuals to install software •Determine a computer's installed RAM and available hard disk drive storage space	Hands-on demonstration with an evaluator using a checklist. Please print form found in **Portfolio Documents** folder on the ABTEL Competencies CD-ROM. Signatures of candidate and evaluator or evaluator's designee are required.	Please include document labeled as : Standard 1 Checklist

ABTEL ASSESSMENT RECOMMENDATIONS

Std. No.	Statement	Enablers / Rationale	Indicators	Assessment	Portfolio
2	Apply knowledge of terminology associated with educational computing and technology	•Apply functional knowledge of basic computer components and various technology tools. --- Educators need a common vocabulary and a functional understanding of educational technologies.	HARDWARE (and related) TERMS: CPU, monitor, keyboard, diskette, hard (disk) drive, mouse, memory, RAM, bytes, CD-ROM, peripherals, input/output device, modem, external disk drive, printer, scanner, digital camera, LCD Panel, port, SCSI, cable, video projector, laser disc player. SOFTWARE (and related) TERMS: boot, cursor, double or single click, drag, open, close and put away, shut down, trash, delete, icon, desktop, folders, files, font, directories, format (initialize), application (program), operating system, load (install or setup), back-up.	Drag and drop matching using pictures and definitions, to be completed using the computer. File is located in the **Portfolio Documents** folder on the ABTEL Competencies CD-ROM. Print upon completion. --- Matching assessment using terms and definitions. Please print form found in **Portfolio Documents** folder on the ABTEL Competencies CD-ROM.	Please include **two** documents labeled as : Standard 2 Hardware Match Software Match

ABTEL ASSESSMENT RECOMMENDATIONS

Std. No.	Statement	Enablers / Rationale	Indicators	Assessment	Portfolio
3	Apply productivity tools for professional use.	•Use software tools to assist with classroom administrative tasks •Use software tools to design, customize, or individualize instructional materials •Use software to enhance communication with students, parents, and community •Use telecommunications software to collaborate and find resource materials. _____ The use of basic productivity software to aid with student records, correspondence, management, and instructional materials development can be effective and time efficient. Educators should be able to model how technology can be used to enhance learning and job performance.	•Use software to perform administrative tasks as required by my position • maintain student records • complete reports •Use word processing or desktop publishing software to prepare or design working papers as required by my position such as • newsletters, memos, or communication for staff, students, parents, and/or community • overhead transparencies • worksheets • tests) •Use spreadsheet software to • calculate student grades • prepare budgets • calendars • worksheets •Use database software to • organize and report information (student related, inventories, etc.)	Provide one self-created document of your choice for each of the four document types listed below which exemplifies appropriate utilization of technology as required by your professional position: word processing database spreadsheet overhead slide	Please include four documents labeled as : Standard 3 Standard 3 WP Standard 3 DB Standard 3 SS Standard 3 OS

ABTEL ASSESSMENT RECOMMENDATIONS

Std. No.	Statement	Enablers / Rationale	Indicators	Assessment	Portfolio
4	Use electronic technologies to access and exchange information.	•Use local and worldwide telecommunications •Use search strategies to retrieve electronic information --- An understanding of how to search for, organize, and present information using modern media is becoming a common workplace and learning skill. State and national technology initiatives are moving toward local area networks for all schools. These networks are connected to state, national, and international networks. Educators must know how to access networks and to exchange and/or retrieve information for both teaching and professional development.	•Use an Internet browser such as Netscape •Effectively use an e-mail account •Research information on the Internet using search engines •Access electronic encyclopedias to locate relevant information •Use networks	Please provide a printed copy of each type of indicator listed below. Print during use (browser page, search result, e-mail communication, electronic encyclopedia).	Please include four documents labeled as: Standard 4 Standard 4 Browser Standard 4 Search Standard 4 E-mail Standard 4 Electronic Encyclopedia

ABTEL ASSESSMENT RECOMMENDATIONS

Std. No.	Statement	Enablers / Rationale	Indicators	Assessment	Portfolio
5	Identify, locate, evaluate, and use appropriate instructional technology-based resources (hardware and software) to support Standards of Learning and other instructional objectives.	•Understand types, characteristics, sources, and use of effective instructional software and other technology-based learning resources --- Use tools of technology including, but not limited to, computers, modems, networks,printers,large group presentation devices, scanners, digital cameras, camcorders, video cassette recorders, optical disc players, etc.	•Use the electronic resources available in a school media center •Use the electronic resources available in a modern library. •Evaluate relevant software for purchase for use in the classroom •Use "Drill & Practice" software within the classroom •Use software specifically designed to supplement instruction • Integrated Learning Systems • Windows on Science • Writing Skills with computers in the classroom •Use voice technologies in conducting lessons that specifically address SOL's such as audio cassettes •Use video technologies in conducting lessons that specifically address SOL's, (i.e. video cassettes and/or discs	Survey and list relevant electronic resources available in the library (or within your department, team or grade level). Survey and list software available to enhance instruction (Drill & Practice, instructional, productivity) available in the library (or your department, etc.) relevant to your subject discipline. Include two examples of student work produced while accessing programs cited in previous list. Survey and list titles relating to voice / video technologies which could be used to specifically address SOL's. Sample form is located in the Pilot Documents folder.	Please include six documents labeled as: Standard 5 Electronic Resources Software Resources Student Product 1 Student Product 2 Voice Technologies Video Technologies

ABTEL ASSESSMENT RECOMMENDATIONS

Std. No.	Statement	Enablers / Rationale	Indicators	Assessment	Portfolio
6	Use educational technologies for data collection, information management, problem solving, decision making, communications, and presentations within the curriculum.	•Incorporate word processing, spreadsheet, or database software in instruction •Incorporate telecommunications as a component of instruction •Use a presentation and/or authoring program to present a lesson or develop instructional materials ——————— Many modern jobs require the skills that are mentioned in this standard. Students will need learning experiences that help them become life-long learners with the ability to function in these areas, regardless of their eventual work or educational environment. Therefore, teachers must develop and model skills in the use of technology in order to offer students appropriate learning experiences.	•Model the use of... • word processing for my students • spreadsheets for my students • database software for my students • telecommunications (Internet or on-line services) as a component of instruction •Engage students in using... • word processing software as a part of a lesson • spreadsheets as part of a lesson • database software as a part of a lesson • telecommunications as a part of the lesson	Provide **two** applicant-generated documents of your choice through which appropriate uses of technology were modeled. Please include examples of any two different types from the following: • word processing • spreadsheet • database • telecommunication Please provide **two** student-generated documents, each of a different type, which resulted from students having been engaged in the use of the following: • word processing • spreadsheet • database • telecommunication	Please include **four** documents labeled as: Standard 6 Applicant Model 1 Applicant Model 2 Student Product 1 Student Product 2

ABTEL ASSESSMENT RECOMMENDATIONS

Std. No.	Statement	Enablers / Rationale	Indicators	Assessment	Portfolio
7	Plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings.	•Utilize technology to facilitate assessment and student-centered multimedia, hypermedia, and telecommunications software to support individual and/or small group instruction •Dictate, utilize and/or understand resources available concerning adaptive technology •Use technology effectively in various educational settings • one computer in the classroom • class-size computer lab • computers in classroom clusters or mini-labs • multimedia computer work stations, integrated learning systems (ILS) •Effectively utilize an automated library media center Educators strive to be responsive to the individual needs and learning styles of a diverse group of students. Technology-based resources can be used to meet these diverse needs in a variety of classroom and laboratory settings.	•Conduct a lesson that has students use telecommunications software to support their learning •Conduct a lesson which incorporates one of the following, dependent upon available technology: • Utilizes a single computer in the classroom • Utilizes a class-size computer lab • Utilizes an automated library media center	Provide documentation in the form of lesson plans or supplementary materials which exemplify your incorporation or utilization of any <u>two</u> of the following: • telecommunications • single computer • computer lab • automated library	Please include <u>two</u> documents labeled them as: <u>Standard 7</u> Standard 7A Standard 7B

ABTEL ASSESSMENT RECOMMENDATIONS

Std. No.	Statement	Enablers / Rationale	Indicators	Assessment	Portfolio
8	Demonstrate knowledge of ethical and legal issues relating to the use of technology.	•Demonstrate knowledge of ethical and legal issues relating to the use of technology --- Educators using instructional technology serve as models for students. They must have a basic understanding of the complex issues regarding the legal and ethical uses of technology.	•Model the ... • understanding of applicable copyright laws when using technology • legal use of licensed software • ethical use of Internet resources for educational purposes • responsible use of computer hardware	N/A	N/A

Gloucester County Public Schools
ABTEL Portfolio Contents List

	Document Name	Origin	Standard
1	Checklist	CD-ROM	1
2	Hardware Match	CD-ROM	2A
3	Software Match	CD-ROM	2B
4	Standard 3 WP	Applicant-Created	3
5	Standard 3 DB	Applicant-Created	3
6	Standard 3 SS	Applicant-Created	3
7	Standard 3 OS	Applicant-Created	3
8	Standard 4 Browser	Applicant-Supplied	4
9	Standard 4 Search	Applicant-Supplied	4
10	Standard 4 E-mail	Applicant-Created	4
11	Standard 4 Electronic Encyclopedia	Applicant-Supplied	4
12	Electronic Resources	Sample Form on CD-ROM	5
13	Software Resources	Applicant-Created	5
14	Student Product 1	Student-Created	5
15	Student Product 2	Student-Created	5
16	Voice Technologies	Applicant-Created	5
17	Video Technologies	Applicant-Created	5
18	Applicant Model 1	Applicant-Created	6
19	Applicant Model 2	Applicant-Created	6
20	Student Product 1	Student-Created	6
21	Student Product 2	Student-Created	6
22	Standard 7A	Applicant-Created	7
23	Standard 7B	Applicant-Created	7
	None Required	xx	8

Appendix H

Table 20

Number of Respondents and Percentage of Elementary Participants by Level of Proficiency on Standard #1.

Indicator	Respondents	%Yes	%No	%Unsure
3	197	97.5%	0.0%	2.5%
4	197	98.0%	0.0%	2.0%
5	197	97.0%	0.5%	2.5%
6	197	57.9%	22.8%	19.3%
7	197	81.7%	8.1%	10.2%
8	197	69.5%	12.7%	17.8%
9	197	52.3%	23.9%	23.9%
10	197	49.2%	25.9%	24.9%
11	197	70.1%	16.2%	13.7%
12	199	72.9%	16.6%	10.6%
13	197	42.6%	29.9%	27.4%
14	197	50.8%	26.4%	22.8%
15	197	55.8%	25.9%	18.3%
16	198	66.7%	20.7%	12.6%
17	197	27.4%	52.8%	19.8%
18	197	33.5%	48.2%	18.3%
19	198	58.1%	27.8%	14.1%

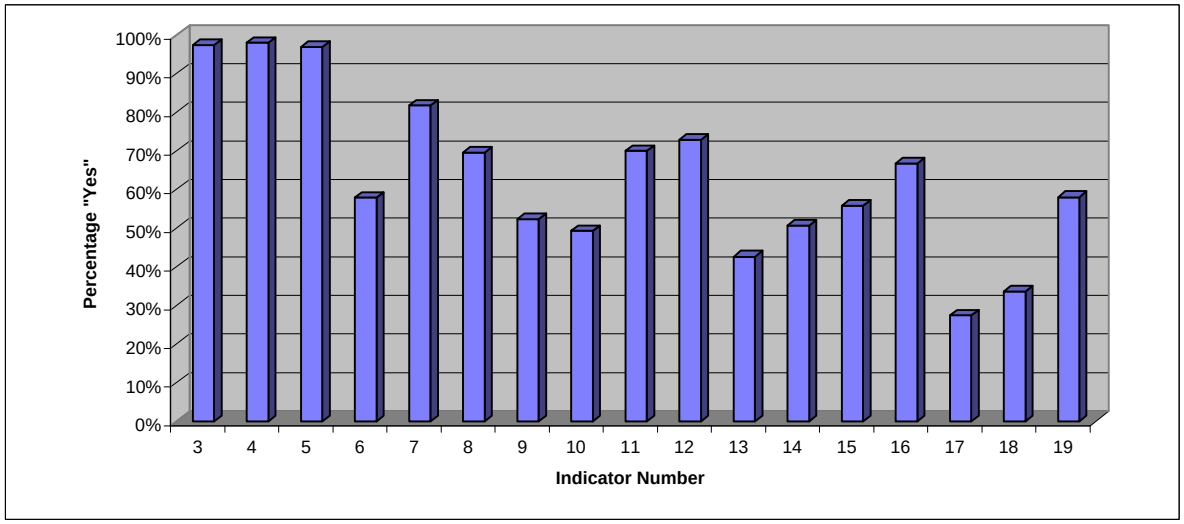


Figure 11. Percentage of elementary participants responding yes to indicators for standard #1.

Table 21

Number of Respondents and Percentage of Elementary Participants by Level of Proficiency on Standard #2 (Hardware).

Indicator	Respondents	%Yes	%No	%Unsure
20	195	75.4%	20.5%	4.1%
21	196	99.5%	0.0%	0.5%
22	197	100.0%	0.0%	0.0%
23	198	98.0%	0.5%	1.5%
24	197	96.4%	2.5%	1.0%
25	197	100.0%	0.0%	0.0%
26	198	96.0%	1.5%	2.5%
27	196	65.3%	20.9%	13.8%
28	197	90.4%	3.6%	6.1%
29	198	79.8%	10.1%	10.1%
30	197	57.4%	23.9%	18.8%
31	196	78.1%	15.8%	6.1%
32	197	50.3%	37.1%	12.7%
33	197	27.9%	47.2%	24.9%
34	197	23.9%	49.2%	26.9%
35	197	18.8%	54.3%	26.9%
36	196	17.9%	55.1%	27.0%
37	197	53.8%	34.0%	12.2%
38	197	55.8%	33.5%	10.7%
39	198	9.6%	73.2%	17.2%
40	198	62.1%	25.8%	12.1%
41	197	26.4%	57.4%	16.2%
42	197	46.2%	36.0%	17.8%
43	197	8.1%	75.6%	16.2%
44	197	60.4%	29.4%	10.2%
45	197	75.1%	17.3%	7.6%
46	197	48.2%	36.0%	15.7%

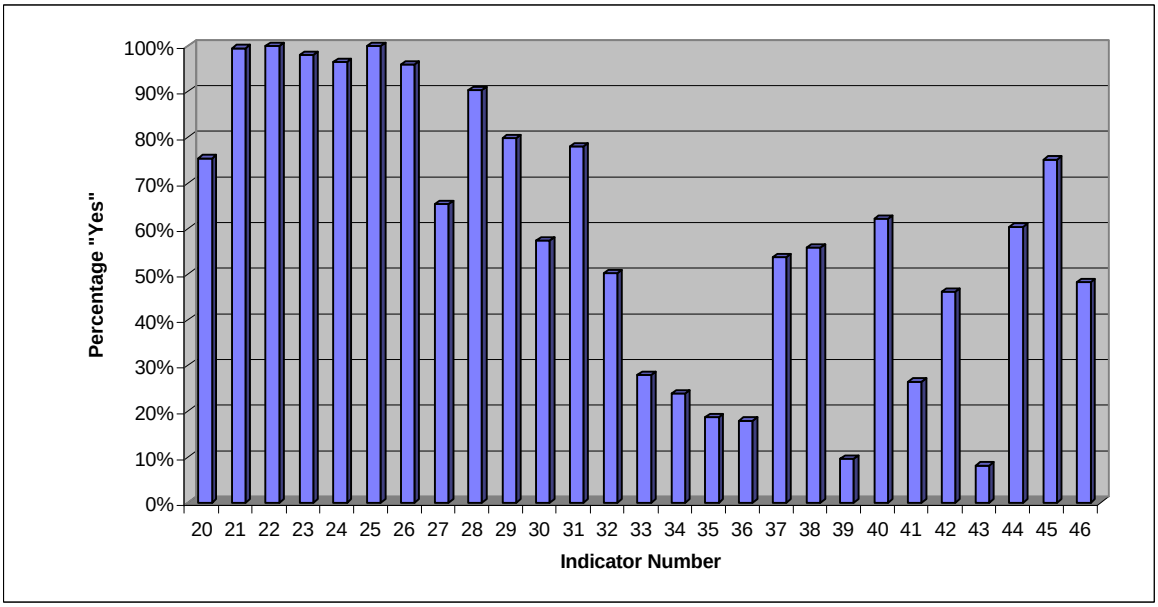


Figure 12. Percentage of elementary participants responding yes to indicators for standard #2 (Hardware).

Table 22

Number of Respondents and Percentage of Elementary Participants by Level of Proficiency on Standard #2 (Software).

Indicator	Respondents	%Yes	%No	%Unsure
47	198	92.9%	5.1%	2.0%
48	198	98.5%	1.5%	0.0%
49	198	99.5%	0.5%	0.0%
50	198	98.5%	0.5%	1.0%
51	197	97.5%	2.0%	0.5%
52	197	99.0%	1.0%	0.0%
53	196	96.9%	1.5%	1.5%
54	196	98.5%	0.5%	1.0%
55	197	93.9%	2.5%	3.6%
56	196	94.9%	0.5%	4.6%
57	197	90.9%	3.6%	5.6%
58	196	96.9%	2.0%	1.0%
59	197	69.5%	15.7%	14.7%
60	197	73.1%	16.8%	10.2%
61	197	52.3%	29.4%	18.3%
62	196	52.6%	29.1%	18.4%
63	197	88.8%	6.6%	4.6%
64	197	63.5%	22.8%	13.7%
65	198	72.2%	16.2%	11.6%
66	198	37.9%	42.4%	19.7%
67	197	7.6%	72.6%	19.8%
68	197	46.2%	35.5%	18.3%

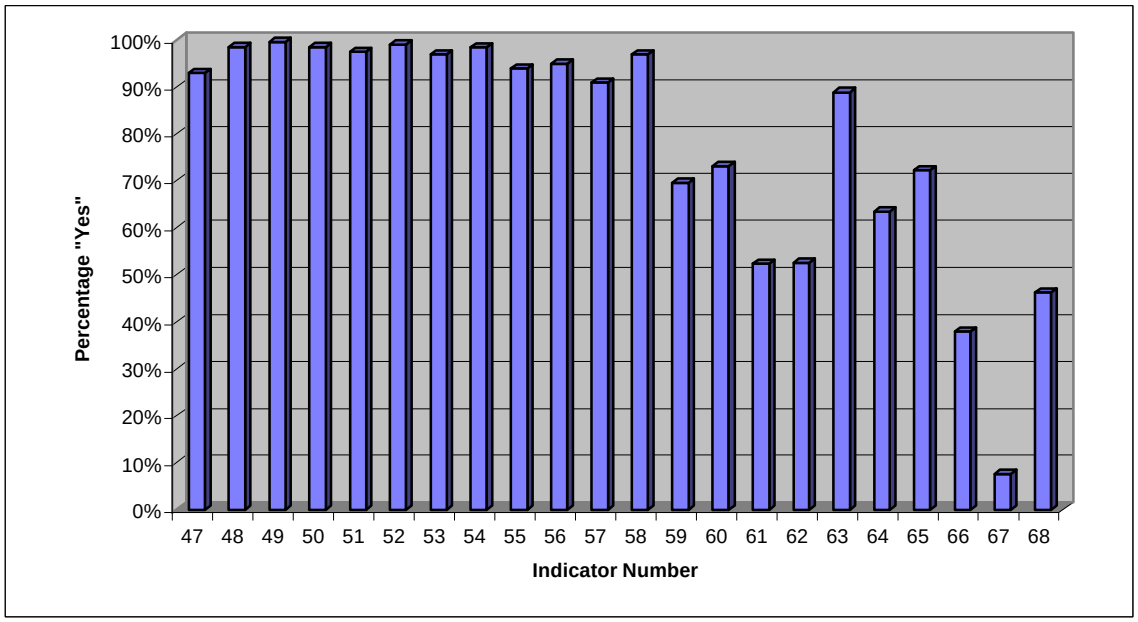


Figure 13. Percentage of elementary participants responding yes to indicators for standard #2 (Software).

Table 23

Number of Respondents and Percentage of Elementary Participants by Level of Proficiency on Standard #3).

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
73	195	28.2%	25.6%	30.3%	10.8%	5.1%
74	197	12.7%	17.8%	35.0%	24.9%	9.6%
75	197	46.2%	29.4%	15.7%	6.6%	2.0%
76	197	46.2%	24.4%	17.3%	10.2%	2.0%
77	197	46.7%	24.4%	18.8%	8.6%	1.5%
78	197	11.7%	13.2%	40.6%	22.8%	11.7%
79	197	13.7%	15.2%	38.1%	22.3%	10.7%
80	198	67.2%	13.1%	13.6%	3.5%	2.5%
81	197	45.7%	22.8%	18.8%	10.2%	2.5%
82	197	25.4%	19.3%	32.5%	15.7%	7.1%
83	197	27.9%	16.2%	33.5%	16.2%	6.1%
84	198	19.7%	32.3%	33.3%	11.1%	3.5%
85	197	21.3%	34.0%	32.0%	9.1%	3.6%
86	197	70.1%	17.8%	10.2%	1.5%	0.5%
87	197	58.4%	23.4%	12.2%	3.0%	3.0%

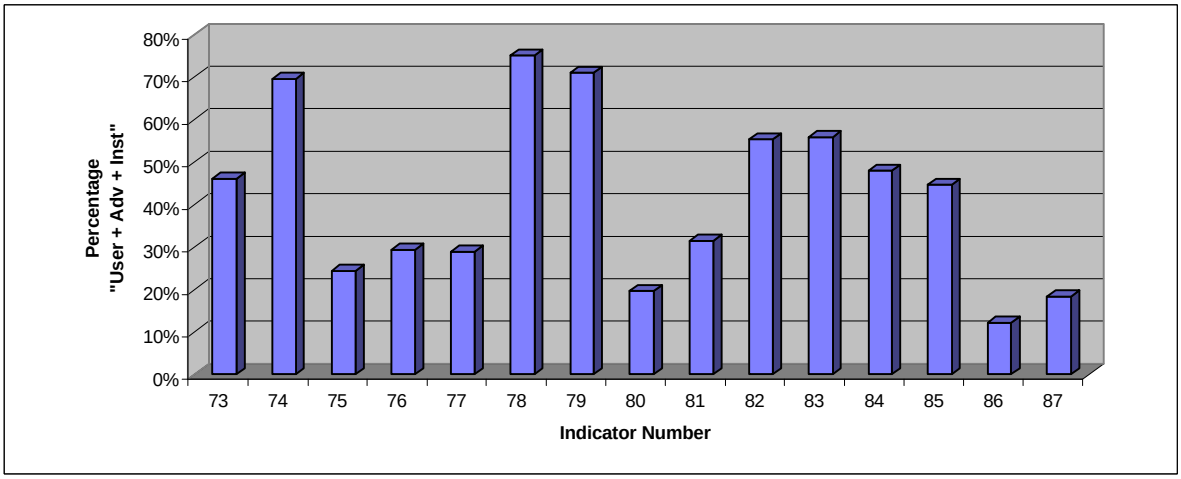


Figure 14. Percentage of elementary participants responding user, advanced, and instructor to indicators for standard #3.

Table 24

Number of Respondents and Percentage of Elementary Participants by Level of Proficiency on Standard #4).

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
88	198	37.9%	26.3%	24.7%	8.6%	2.5%
89	197	25.9%	27.4%	31.5%	12.2%	3.0%
90	197	21.8%	35.5%	26.4%	13.2%	3.0%
91	198	35.4%	24.7%	26.3%	12.6%	1.0%
92	199	27.1%	28.6%	28.1%	12.1%	4.0%
93	197	46.2%	22.8%	20.8%	8.6%	1.5%
94	197	50.8%	23.4%	19.8%	5.6%	0.5%
95	197	53.3%	20.8%	20.8%	4.6%	0.5%

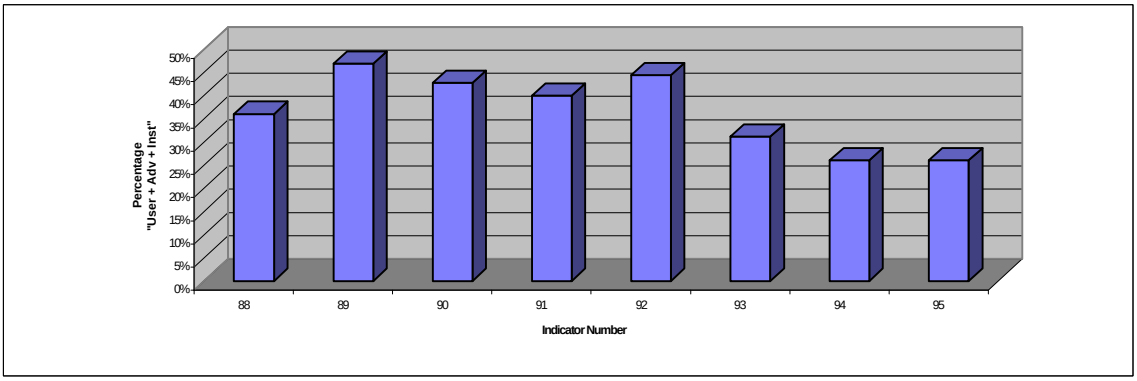


Figure 15. Percentage of elementary participants responding user, advanced, and instructor to indicators for standard #4.

Table 25

Number of Respondents and Percentage of Elementary Participants by Level of Proficiency on Standard #5).

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
96	197	17.3%	38.6%	33.0%	10.2%	1.0%
97	197	22.3%	33.5%	35.0%	8.1%	1.0%
98	196	28.6%	33.2%	27.6%	9.7%	1.0%
99	194	20.1%	16.0%	43.8%	17.0%	3.1%
100	198	25.3%	30.8%	34.3%	8.1%	1.5%
101	195	42.6%	11.8%	27.7%	12.3%	5.6%
102	196	48.5%	20.4%	20.9%	8.2%	2.0%
103	196	32.1%	13.8%	35.7%	12.8%	5.6%

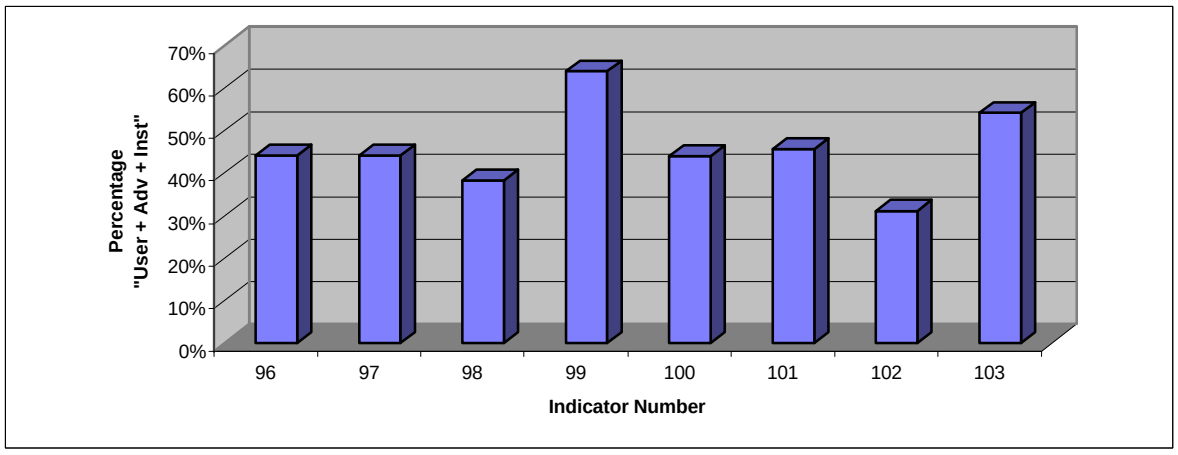


Figure 16. Percentage of elementary participants responding user, advanced, and instructor to indicators for standard #5.

Table 26

Number of Respondents and Percentage of Elementary Participants by Level of Proficiency on Standard #6).

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
104	195	11.3%	26.2%	36.4%	18.5%	7.7%
105	194	55.7%	24.7%	13.9%	4.6%	1.0%
106	195	55.4%	25.6%	11.8%	6.2%	1.0%
107	196	43.4%	28.6%	20.9%	5.1%	2.0%
108	196	60.2%	21.9%	13.3%	2.6%	2.0%
109	195	24.6%	31.3%	29.7%	10.8%	3.6%
110	196	68.9%	19.9%	8.2%	1.5%	1.5%
111	195	66.2%	17.9%	12.8%	2.1%	1.0%
112	196	56.6%	19.9%	16.3%	4.6%	2.6%
113	195	62.6%	18.5%	13.8%	4.6%	0.5%

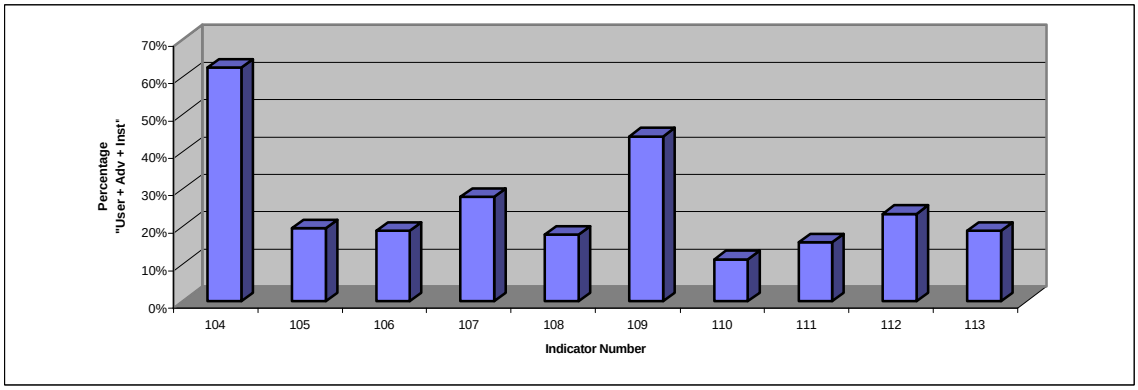


Figure 17. Percentage of elementary participants responding user, advanced, and instructor to indicators for standard #6.

Table 27

Number of Respondents and Percentage of Elementary Participants by Level of Proficiency on Standard #7).

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
114	195	39.0%	30.8%	24.1%	3.6%	2.6%
115	195	43.1%	29.7%	20.0%	5.1%	2.1%
116	195	76.4%	14.9%	5.1%	3.1%	0.5%
117	195	57.9%	25.1%	12.3%	3.1%	1.5%
118	194	65.5%	19.1%	10.3%	4.1%	1.0%
119	195	12.8%	20.0%	48.2%	14.9%	4.1%
120	195	24.6%	19.0%	43.6%	9.2%	3.6%
121	195	27.2%	17.4%	42.1%	9.7%	3.6%
122	195	28.2%	14.9%	45.1%	8.7%	3.1%
123	195	57.4%	16.4%	19.5%	5.1%	1.5%
124	195	69.7%	11.3%	16.4%	2.1%	0.5%
125	195	86.7%	8.2%	3.6%	0.5%	1.0%
126	192	81.3%	12.0%	5.2%	0.5%	1.0%
127	190	31.6%	33.2%	27.4%	6.3%	1.6%

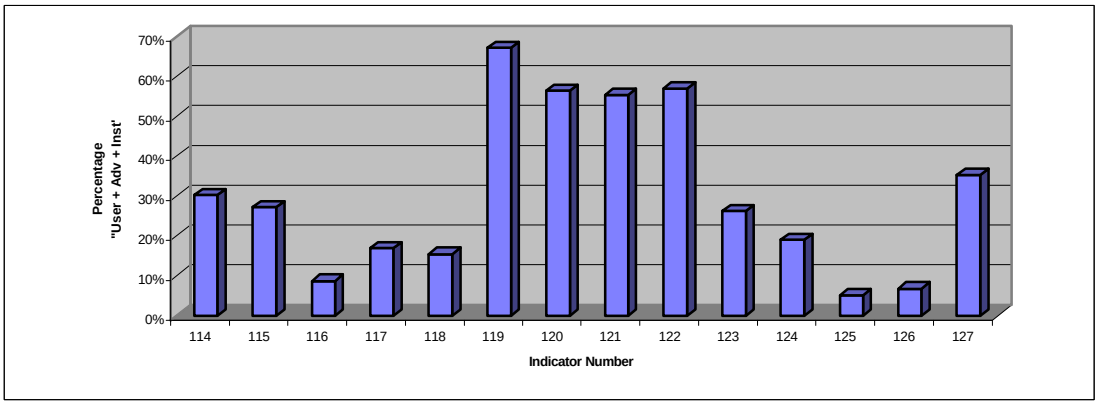


Figure 18. Percentage of elementary participants responding user, advanced, and instructor to indicators for standard #7.

Table 28

Number of Respondents and Percentage of Elementary Participants by Level of Proficiency on Standard #8).

Indicator	Respondents	%Yes	%No	%Unsure
69	197	74.1%	12.7%	13.2%
70	196	82.7%	6.6%	10.7%
71	197	77.7%	11.2%	11.2%
72	197	84.3%	8.1%	7.6%

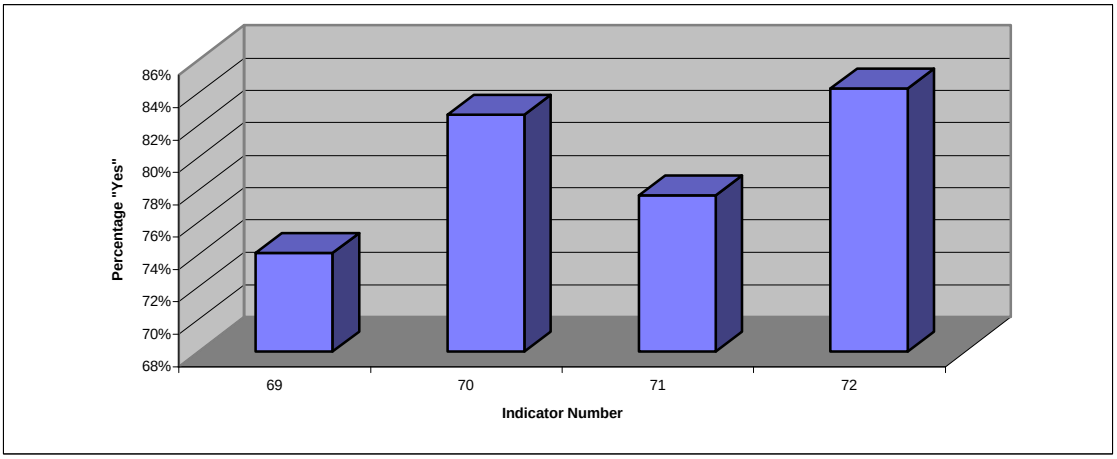


Figure 19. Percentage of elementary participants responding yes to indicators for standard #8.

Table 29

Number of Respondents and Percentage of Middle School Participants by Level of Proficiency on Standard #1.

Indicator	Respondents	%Yes	%No	%Unsure
3	97	95.9%	0.0%	4.1%
4	97	95.9%	0.0%	4.1%
5	97	96.9%	1.0%	2.1%
6	98	67.3%	21.4%	11.2%
7	97	85.6%	12.4%	2.1%
8	97	76.3%	15.5%	8.2%
9	96	63.5%	22.9%	13.5%
10	97	70.1%	17.5%	12.4%
11	97	73.2%	17.5%	9.3%
12	96	77.1%	17.7%	5.2%
13	98	59.2%	29.6%	11.2%
14	97	69.1%	22.7%	8.2%
15	97	60.8%	23.7%	15.5%
16	99	58.6%	20.2%	21.2%
17	99	37.4%	39.4%	23.2%
18	98	52.0%	31.6%	16.3%
19	97	60.8%	20.6%	18.6%

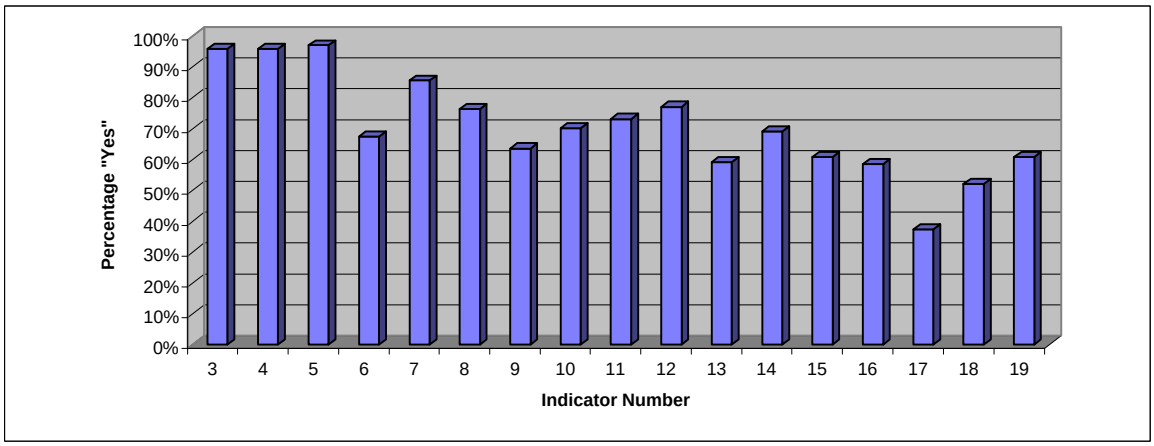


Figure 20. Percentage of middle school participants responding yes to indicators for standard #1.

Table 30

Number of Respondents and Percentage of Middle School Participants by Level of Proficiency on Standard #2 (Hardware).

Indicator	Respondents	%Yes	%No	%Unsure
20	96	79.2%	13.5%	7.3%
21	97	96.9%	1.0%	2.1%
22	96	99.0%	0.0%	1.0%
23	97	95.9%	2.1%	2.1%
24	97	95.9%	3.1%	1.0%
25	97	97.9%	1.0%	1.0%
26	97	91.8%	2.1%	6.2%
27	96	77.1%	11.5%	11.5%
28	96	88.5%	4.2%	7.3%
29	97	87.6%	7.2%	5.2%
30	97	71.1%	20.6%	8.2%
31	98	77.6%	15.3%	7.1%
32	95	65.3%	24.2%	10.5%
33	96	47.9%	34.4%	17.7%
34	96	33.3%	44.8%	21.9%
35	96	34.4%	46.9%	18.8%
36	96	34.4%	45.8%	19.8%
37	98	67.3%	25.5%	7.1%
38	97	64.9%	20.6%	14.4%
39	97	18.6%	67.0%	14.4%
40	97	73.2%	18.6%	8.2%
41	97	53.6%	38.1%	8.2%
42	96	60.4%	30.2%	9.4%
43	97	17.5%	66.0%	16.5%
44	97	81.4%	11.3%	7.2%
45	97	79.4%	10.3%	10.3%
46	96	57.3%	26.0%	16.7%

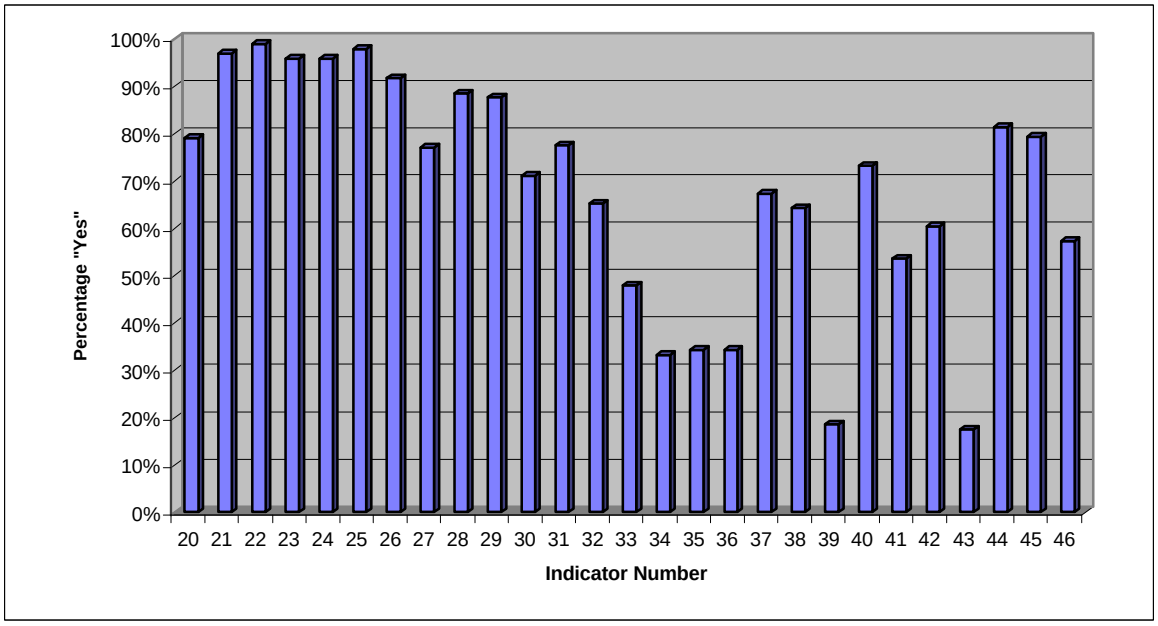


Figure 21. Percentage of middle school participants responding yes to indicators for standard #2 (Hardware).

Table 31

Number of Respondents and Percentage of Middle School Participants by Level of Proficiency on Standard #2 (Software).

Indicator	Respondents	%Yes	%No	%Unsure
47	97	93.8%	3.1%	3.1%
48	96	96.9%	1.0%	2.1%
49	96	96.9%	1.0%	2.1%
50	96	92.7%	4.2%	3.1%
51	97	92.8%	3.1%	4.1%
52	96	97.9%	0.0%	2.1%
53	97	95.9%	2.1%	2.1%
54	98	98.0%	0.0%	2.0%
55	97	88.7%	7.2%	4.1%
56	97	91.8%	2.1%	6.2%
57	97	88.7%	3.1%	8.2%
58	96	91.7%	4.2%	4.2%
59	98	69.4%	17.3%	13.3%
60	97	79.4%	15.5%	5.2%
61	97	64.9%	24.7%	10.3%
62	97	63.9%	25.8%	10.3%
63	97	87.6%	6.2%	6.2%
64	97	75.3%	19.6%	5.2%
65	97	74.2%	17.5%	8.2%
66	98	40.8%	37.8%	21.4%
67	96	9.4%	71.9%	18.8%
68	97	45.4%	38.1%	16.5%

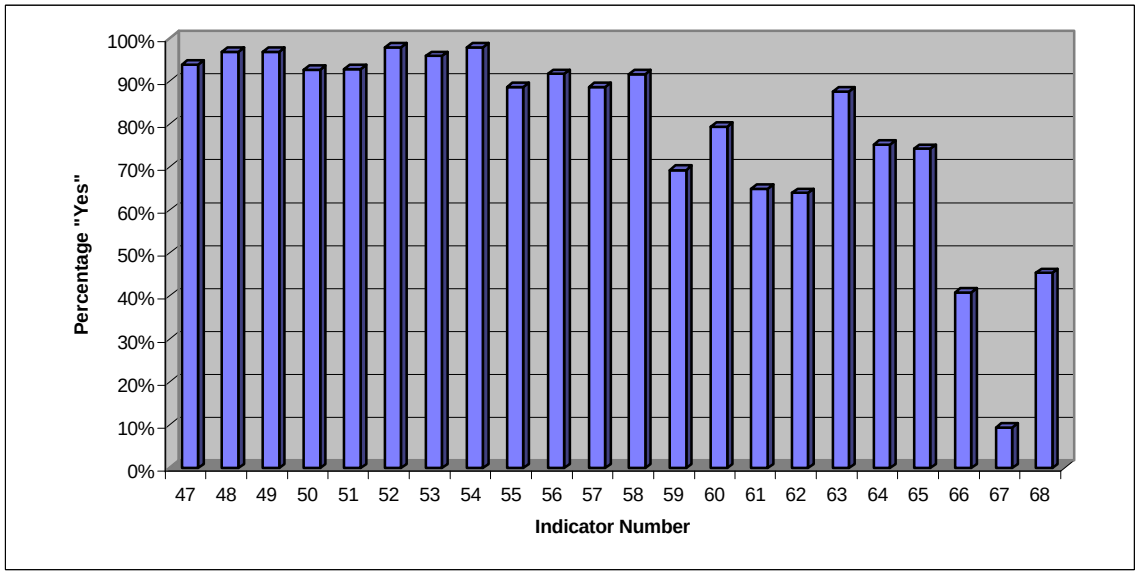


Figure 22. Percentage of middle school participants responding yes to indicators for standard #2 (Software).

Table 32

Number of Respondents and Percentage of Middle School Participants by Level of Proficiency on Standard #3.

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
73	96	25.0%	17.7%	29.2%	17.7%	10.4%
74	97	17.5%	6.2%	36.1%	16.5%	23.7%
75	99	38.4%	21.2%	24.2%	12.1%	4.0%
76	98	35.7%	25.5%	21.4%	12.2%	5.1%
77	99	37.4%	26.3%	18.2%	13.1%	5.1%
78	97	15.5%	11.3%	30.9%	20.6%	21.6%
79	96	22.9%	14.6%	26.0%	20.8%	15.6%
80	97	54.6%	17.5%	10.3%	10.3%	7.2%
81	97	36.1%	22.7%	20.6%	13.4%	7.2%
82	97	16.5%	20.6%	27.8%	19.6%	15.5%
83	97	17.5%	13.4%	30.9%	23.7%	14.4%
84	95	21.1%	28.4%	22.1%	20.0%	8.4%
85	96	21.9%	29.2%	24.0%	17.7%	7.3%
86	98	61.2%	16.3%	15.3%	4.1%	3.1%
87	97	43.3%	17.5%	22.7%	11.3%	5.2%

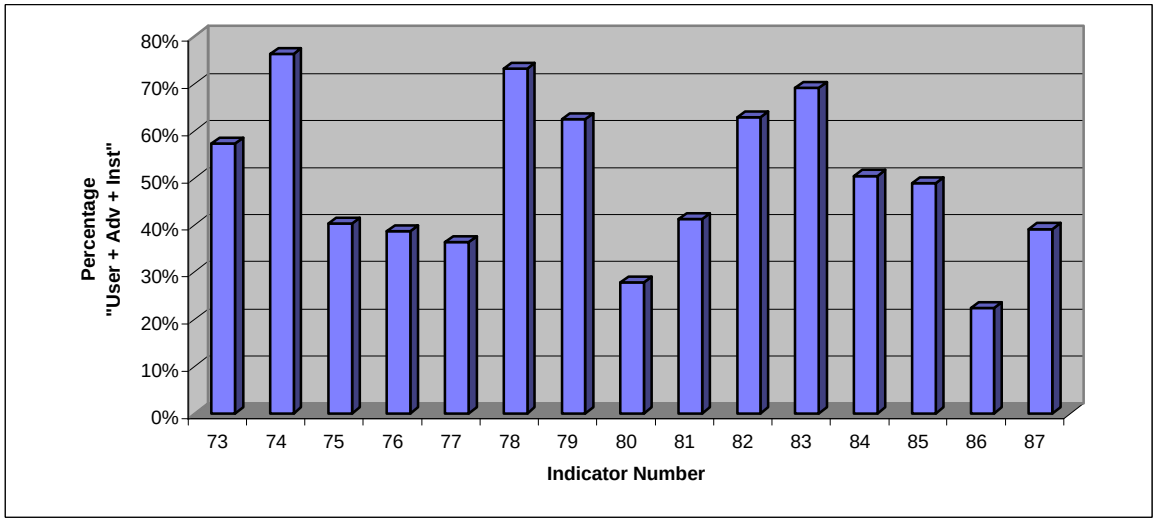


Figure 23. Percentage of middle school participants responding user, advanced, and instructor to indicators for standard #3.

Table 33

Number of Respondents and Percentage of Middle School Participants by Level of Proficiency on Standard #4.

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
88	95	33.7%	15.8%	26.3%	16.8%	7.4%
89	96	19.8%	22.9%	33.3%	16.7%	7.3%
90	98	18.4%	28.6%	25.5%	19.4%	8.2%
91	100	23.0%	27.0%	29.0%	15.0%	6.0%
92	98	25.5%	16.3%	28.6%	20.4%	9.2%
93	97	32.0%	18.6%	26.8%	14.4%	8.2%
94	97	33.0%	19.6%	28.9%	12.4%	6.2%
95	97	33.0%	19.6%	28.9%	14.4%	4.1%

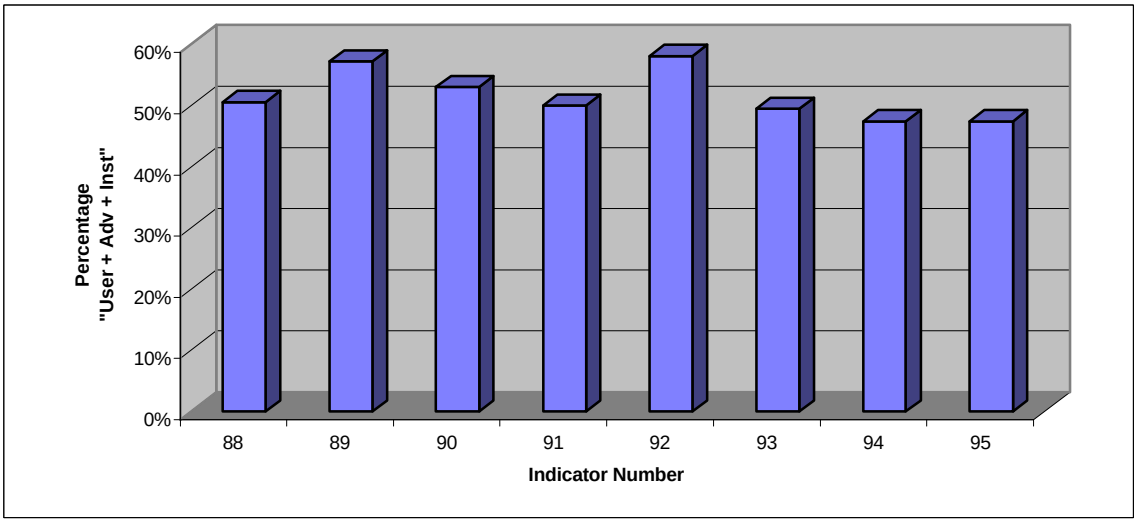


Figure 24. Percentage of middle school participants responding user, advanced, and instructor to indicators for standard #4.

Table 34

Number of Respondents and Percentage of Middle School Participants by Level of Proficiency on Standard #5.

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
96	99	14.1%	30.3%	34.3%	18.2%	3.0%
97	100	16.0%	28.0%	36.0%	17.0%	3.0%
98	97	22.7%	21.6%	32.0%	17.5%	6.2%
99	97	24.7%	16.5%	33.0%	17.5%	8.2%
100	97	38.1%	13.4%	27.8%	13.4%	7.2%
101	96	36.5%	16.7%	28.1%	9.4%	9.4%
102	99	27.3%	21.2%	32.3%	11.1%	8.1%
103	98	26.5%	14.3%	33.7%	14.3%	11.2%

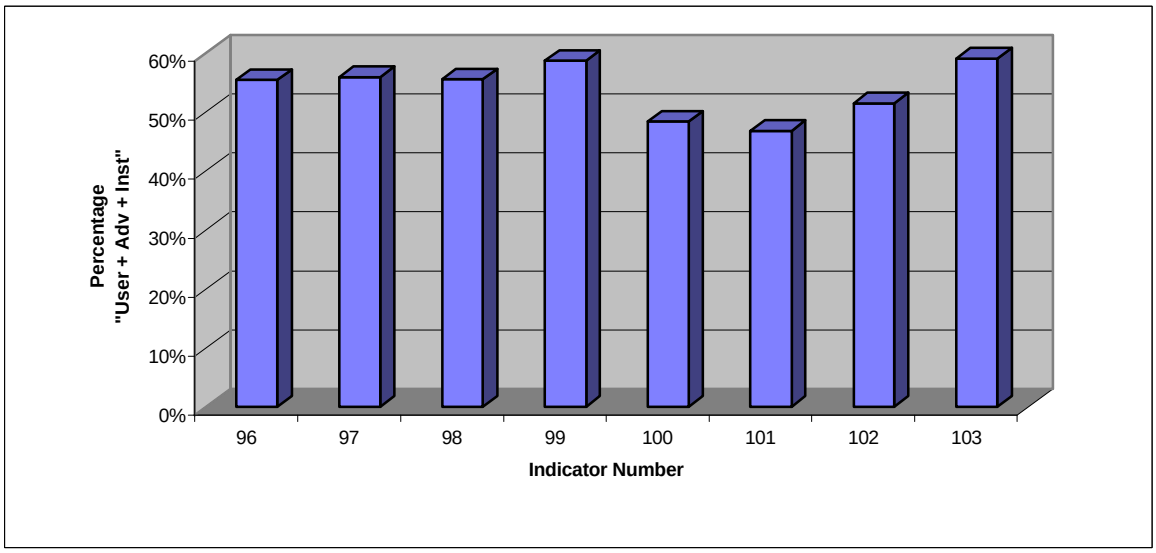


Figure 25. Percentage of middle school participants responding user, advanced, and instructor to indicators for standard #5.

Table 35

Number of Respondents and Percentage of Middle School Participants by Level of Proficiency on Standard #6.

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
104	97	15.5%	18.6%	25.8%	20.6%	19.6%
105	96	37.5%	21.9%	26.0%	9.4%	5.2%
106	98	36.7%	28.6%	19.4%	8.2%	7.1%
107	98	30.6%	25.5%	28.6%	8.2%	7.1%
108	95	43.2%	25.3%	18.9%	7.4%	5.3%
109	98	25.5%	17.3%	31.6%	11.2%	14.3%
110	98	48.0%	20.4%	21.4%	5.1%	5.1%
111	98	40.8%	25.5%	21.4%	5.1%	7.1%
112	97	34.0%	27.8%	20.6%	9.3%	8.2%
113	96	40.6%	31.3%	14.6%	9.4%	4.2%

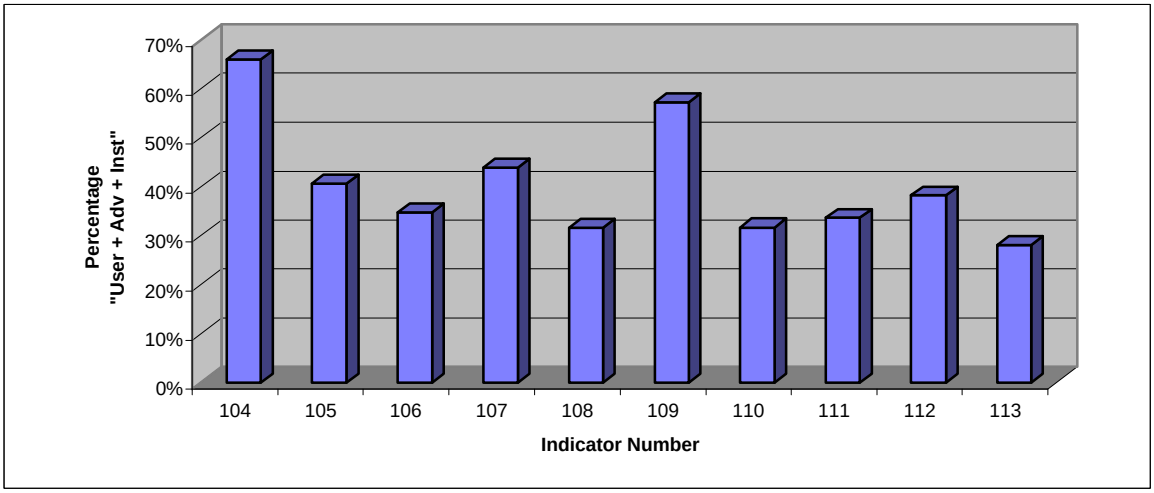


Figure 26. Percentage of middle school participants responding user, advanced, and instructor to indicators for standard #6.

Table 36

Number of Respondents and Percentage of Middle School Participants by Level of Proficiency on Standard #7.

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
114	99	36.4%	29.3%	22.2%	8.1%	4.0%
115	97	36.1%	33.0%	18.6%	5.2%	7.2%
116	96	61.5%	17.7%	14.6%	5.2%	1.0%
117	98	44.9%	24.5%	18.4%	7.1%	5.1%
118	97	47.4%	30.9%	14.4%	5.2%	2.1%
119	97	22.7%	14.4%	36.1%	17.5%	9.3%
120	96	32.3%	19.8%	29.2%	11.5%	7.3%
121	97	29.9%	21.6%	27.8%	11.3%	9.3%
122	97	37.1%	15.5%	28.9%	9.3%	9.3%
123	97	51.5%	15.5%	21.6%	4.1%	7.2%
124	94	66.0%	17.0%	10.6%	3.2%	3.2%
125	96	67.7%	15.6%	12.5%	3.1%	1.0%
126	94	71.3%	17.0%	8.5%	2.1%	1.1%
127	94	31.9%	25.5%	22.3%	17.0%	3.2%

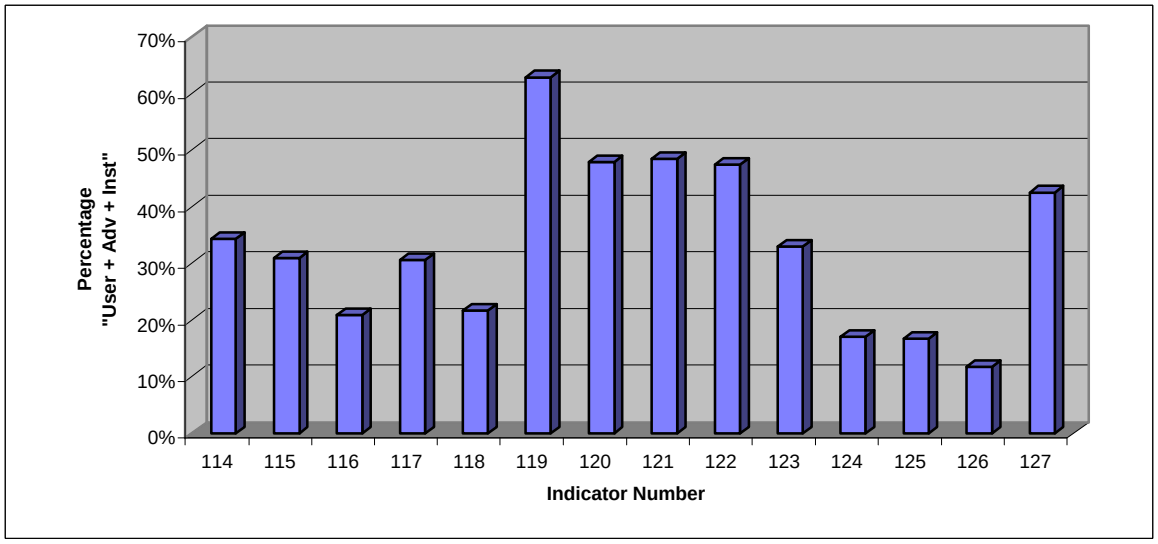


Figure 27. Percentage of middle school participants responding user, advanced, and instructor to indicators for standard #7.

Table 37

Number of Respondents and Percentage of Middle School Participants by Level of Proficiency on Standard #8.

Indicator	Respondents	%Yes	%No	%Unsure
69	97	62.9%	19.6%	17.5%
70	97	75.3%	15.5%	9.3%
71	97	76.3%	17.5%	6.2%
72	97	81.4%	9.3%	9.3%

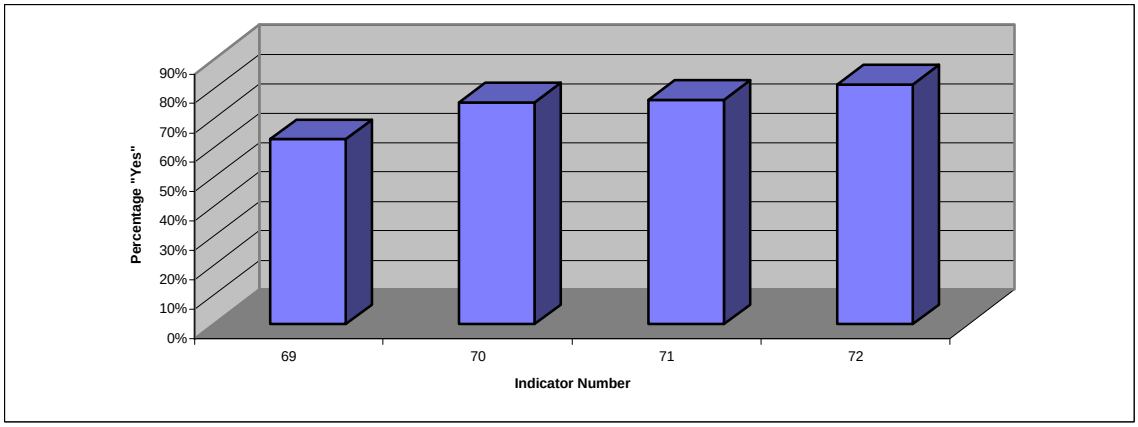


Figure 28. Percentage of middle school participants responding yes to indicators for standard #8.

Table 38

Number of Respondents and Percentage of High School Participants by Level of Proficiency on Standard #1.

Indicator	Respondents	%Yes	%No	%Unsure
3	94	100.0%	0.0%	0.0%
4	92	98.9%	0.0%	1.1%
5	94	98.9%	0.0%	1.1%
6	94	78.7%	9.6%	11.7%
7	94	94.7%	2.1%	3.2%
8	94	93.6%	3.2%	3.2%
9	94	78.7%	10.6%	10.6%
10	94	78.7%	10.6%	10.6%
11	95	87.4%	5.3%	7.4%
12	95	84.2%	8.4%	7.4%
13	95	72.6%	13.7%	13.7%
14	94	72.3%	16.0%	11.7%
15	96	72.9%	19.8%	7.3%
16	95	70.5%	16.8%	12.6%
17	95	50.5%	29.5%	20.0%
18	95	57.9%	27.4%	14.7%
19	95	70.5%	21.1%	8.4%

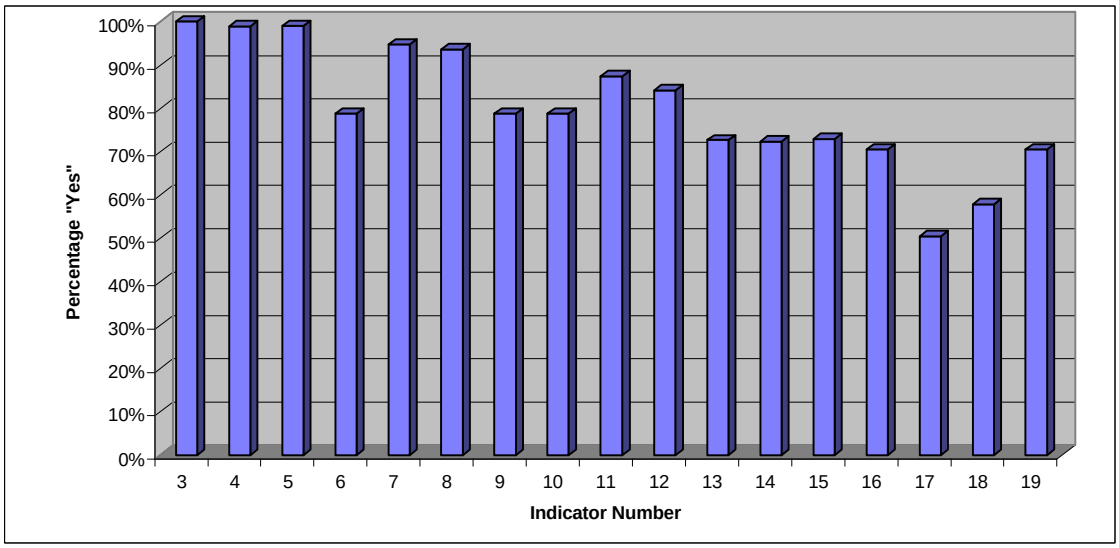


Figure 29. Percentage of high school participants responding yes to indicators for standard #1.

Table 39

Number of Respondents and Percentage of High School Participants by Level of Proficiency on Standard #2 (Hardware).

Indicator	Respondents	%Yes	%No	%Unsure
20	96	68.8%	22.9%	8.3%
21	96	100.0%	0.0%	0.0%
22	96	100.0%	0.0%	0.0%
23	96	100.0%	0.0%	0.0%
24	96	100.0%	0.0%	0.0%
25	96	100.0%	0.0%	0.0%
26	95	100.0%	0.0%	0.0%
27	96	77.1%	11.5%	11.5%
28	96	96.9%	1.0%	2.1%
29	96	91.7%	2.1%	6.3%
30	96	81.3%	8.3%	10.4%
31	96	82.3%	11.5%	6.3%
32	96	77.1%	18.8%	4.2%
33	96	58.3%	27.1%	14.6%
34	96	51.0%	32.3%	16.7%
35	95	48.4%	33.7%	17.9%
36	96	47.9%	37.5%	14.6%
37	97	71.1%	20.6%	8.2%
38	98	63.3%	26.5%	10.2%
39	96	26.0%	57.3%	16.7%
40	96	81.3%	13.5%	5.2%
41	95	47.4%	34.7%	17.9%
42	96	75.0%	14.6%	10.4%
43	96	21.9%	56.3%	21.9%
44	96	81.3%	8.3%	10.4%
45	96	83.3%	10.4%	6.3%
46	96	62.5%	27.1%	10.4%

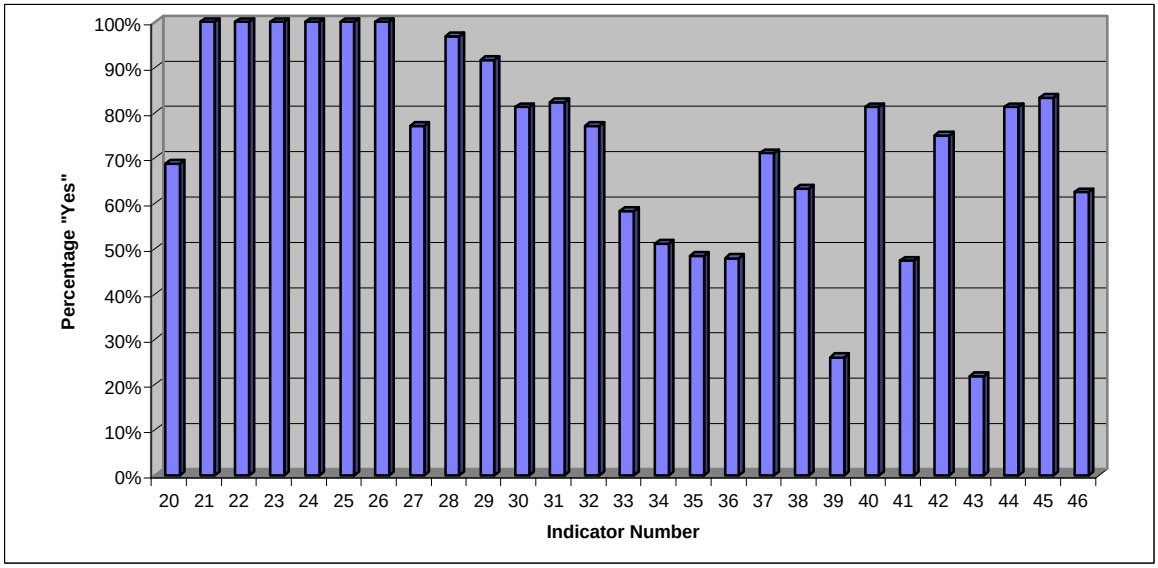


Figure 30. Percentage of high school participants responding yes to indicators for standard #2 (Hardware).

Table 40

Number of Respondents and Percentage of High School Participants by Level of Proficiency on Standard #2 (Software).

Indicator	Respondents	%Yes	%No	%Unsure
47	95	91.6%	5.3%	3.2%
48	95	100.0%	0.0%	0.0%
49	95	98.9%	1.1%	0.0%
50	94	97.9%	2.1%	0.0%
51	95	97.9%	2.1%	0.0%
52	95	97.9%	1.1%	1.1%
53	95	94.7%	1.1%	4.2%
54	96	100.0%	0.0%	0.0%
55	96	97.9%	1.0%	1.0%
56	96	99.0%	0.0%	1.0%
57	95	97.9%	1.1%	1.1%
58	95	98.9%	1.1%	0.0%
59	95	85.3%	10.5%	4.2%
60	95	85.3%	7.4%	7.4%
61	95	75.8%	15.8%	8.4%
62	95	73.7%	15.8%	10.5%
63	95	89.5%	4.2%	6.3%
64	96	79.2%	11.5%	9.4%
65	95	87.4%	8.4%	4.2%
66	95	61.1%	25.3%	13.7%
67	95	25.3%	53.7%	21.1%
68	95	49.5%	32.6%	17.9%

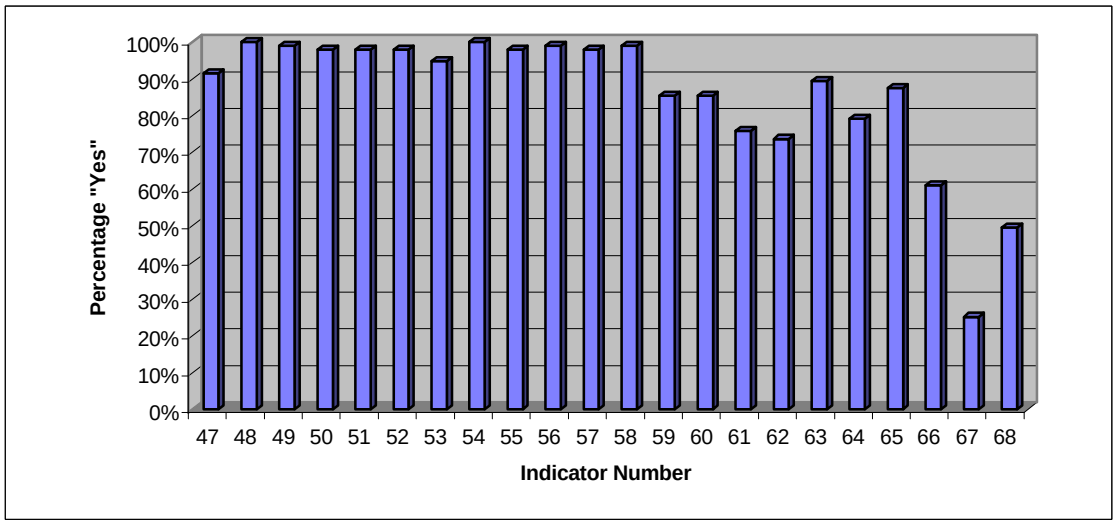


Figure 31. Percentage of high school participants responding yes to indicators for standard #2 (Software).

Table 41

Number of Respondents and Percentage of High School Participants by Level of Proficiency on Standard #3.

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
73	93	20.4%	11.8%	33.3%	22.6%	11.8%
74	94	10.6%	12.8%	25.5%	29.8%	21.3%
75	94	25.5%	26.6%	25.5%	11.7%	10.6%
76	95	17.9%	18.9%	32.6%	21.1%	9.5%
77	95	23.2%	17.9%	31.6%	16.8%	10.5%
78	95	10.5%	11.6%	29.5%	30.5%	17.9%
79	94	12.8%	13.8%	33.0%	26.6%	13.8%
80	95	32.6%	15.8%	29.5%	10.5%	11.6%
81	95	29.5%	20.0%	25.3%	14.7%	10.5%
82	95	15.8%	12.6%	30.5%	25.3%	15.8%
83	95	13.7%	8.4%	32.6%	27.4%	17.9%
84	95	27.4%	17.9%	24.2%	23.2%	7.4%
85	93	22.6%	19.4%	29.0%	19.4%	9.7%
86	92	45.7%	22.8%	18.5%	8.7%	4.3%
87	95	31.6%	24.2%	27.4%	11.6%	5.3%

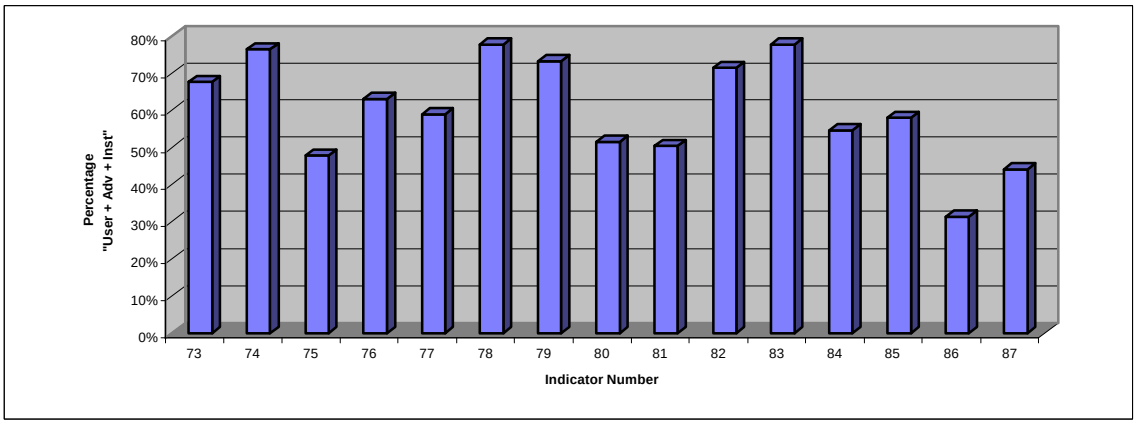


Figure 32. Percentage of high school participants responding user, advanced, and instructor to indicators for standard #3.

Table 42

Number of Respondents and Percentage of High School Participants by Level of Proficiency on Standard #4.

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
88	95	26.3%	20.0%	21.1%	26.3%	6.3%
89	94	18.1%	19.1%	27.7%	25.5%	9.6%
90	94	30.9%	13.8%	24.5%	21.3%	9.6%
91	93	23.7%	18.3%	23.7%	24.7%	9.7%
92	95	20.0%	18.9%	28.4%	24.2%	8.4%
93	95	24.2%	18.9%	25.3%	23.2%	8.4%
94	95	28.4%	21.1%	21.1%	21.1%	8.4%
95	95	26.3%	22.1%	24.2%	18.9%	8.4%

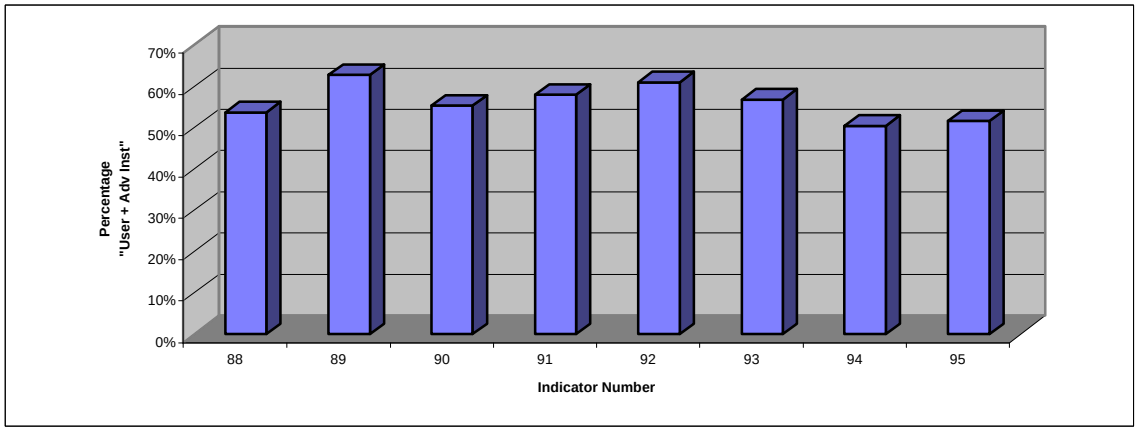


Figure 33. Percentage of high school participants responding user, advanced, and instructor to indicators for standard #4.

Table 43

Number of Respondents and Percentage of High School Participants by Level of Proficiency on Standard #5.

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
96	95	17.9%	23.2%	34.7%	17.9%	6.3%
97	95	17.9%	17.9%	38.9%	18.9%	6.3%
98	95	27.4%	20.0%	27.4%	16.8%	8.4%
99	95	30.5%	15.8%	22.1%	17.9%	13.7%
100	95	32.6%	20.0%	25.3%	11.6%	10.5%
101	96	41.7%	11.5%	18.8%	20.8%	7.3%
102	96	31.3%	17.7%	21.9%	21.9%	7.3%
103	96	30.2%	15.6%	22.9%	21.9%	9.4%

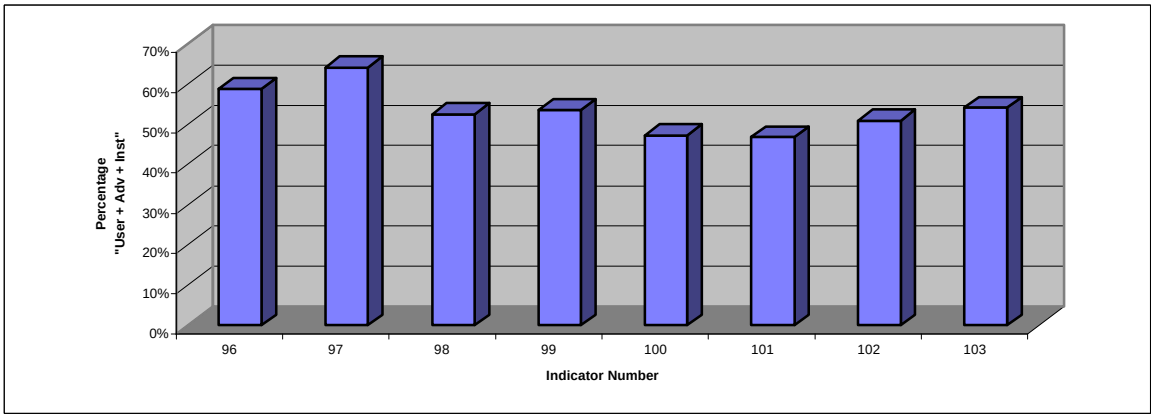


Figure 34. Percentage of high school participants responding user, advanced, and instructor to indicators for standard #5.

Table 44

Number of Respondents and Percentage of High School Participants by Level of Proficiency on Standard #6.

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
104	94	17.0%	9.6%	26.6%	29.8%	17.0%
105	95	33.7%	18.9%	26.3%	13.7%	7.4%
106	94	34.0%	19.1%	21.3%	17.0%	8.5%
107	95	34.7%	14.7%	24.2%	18.9%	7.4%
108	95	34.7%	22.1%	21.1%	14.7%	7.4%
109	95	21.1%	18.9%	26.3%	18.9%	14.7%
110	95	43.2%	21.1%	22.1%	7.4%	6.3%
111	95	43.2%	18.9%	18.9%	12.6%	6.3%
112	95	31.6%	18.9%	25.3%	16.8%	7.4%
113	95	37.9%	13.7%	25.3%	15.8%	7.4%

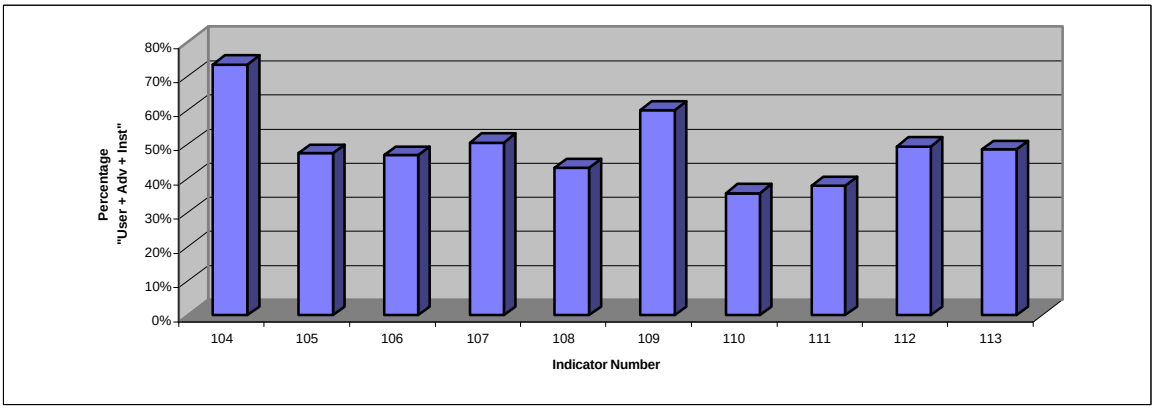


Figure 35. Percentage of high school participants responding user, advanced, and instructor to indicators for standard #6.

Table 45

Number of Respondents and Percentage of High School Participants by Level of Proficiency on Standard #7.

Indicator	Respondents	%Non-User	%Beginner	%User	%Advanced	%Instructor
114	95	28.4%	18.9%	28.4%	15.8%	8.4%
115	95	27.4%	21.1%	30.5%	12.6%	8.4%
116	95	49.5%	18.9%	20.0%	7.4%	4.2%
117	94	42.6%	13.8%	24.5%	14.9%	4.3%
118	95	36.8%	24.2%	20.0%	13.7%	5.3%
119	95	23.2%	18.9%	26.3%	22.1%	9.5%
120	94	29.8%	12.8%	28.7%	22.3%	6.4%
121	95	23.2%	10.5%	33.7%	25.3%	7.4%
122	95	27.4%	10.5%	34.7%	21.1%	6.3%
123	94	43.6%	10.6%	26.6%	12.8%	6.4%
124	94	55.3%	13.8%	18.1%	8.5%	4.3%
125	95	63.2%	11.6%	15.8%	7.4%	2.1%
126	92	62.0%	16.3%	13.0%	6.5%	2.2%
127	92	28.3%	21.7%	32.6%	10.9%	6.5%

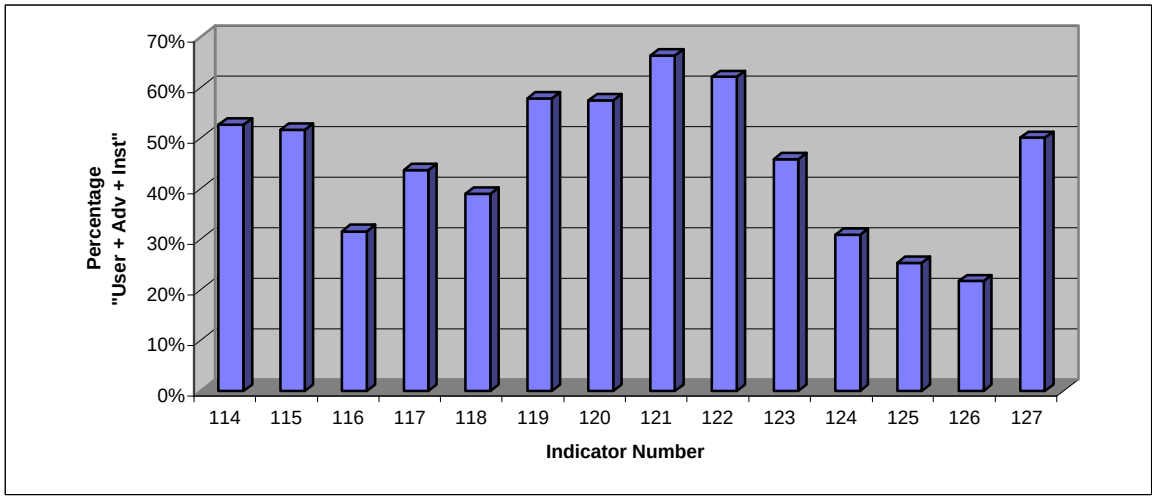


Figure 36. Percentage of high school participants responding user, advanced, and instructor to indicators for standard #7.

Table 46

Number of Respondents and Percentage of High School Participants by Level of Proficiency on Standard #8.

Indicator	Respondents	%Yes	%No	%Unsure
69	95	75.8%	13.7%	10.5%
70	95	84.2%	6.3%	9.5%
71	95	81.1%	8.4%	10.5%
72	95	89.5%	4.2%	6.3%

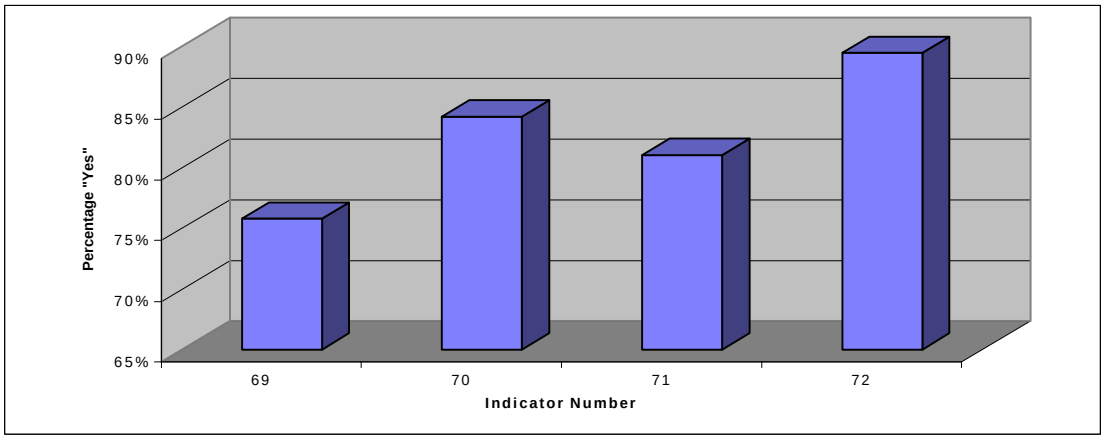


Figure 37. Percentage of high school participants responding yes to indicators for standard #8.

Vita

VITA

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EDUCATIONAL AND PROFESSIONAL TRAINING

1993- Virginia Polytechnic Institute and State University, Blacksburg, VA.
Graduate Student in Educational Administration

1996 Virginia Polytechnic Institute and State University, Blacksburg, VA.
Certificate of Advanced Graduate Studies

1973-1974 Virginia Commonwealth University, Richmond, VA.
Master of Education in Administration and Supervision

1959-1962, 1963-64 University of Richmond, Richmond, VA.
Bachelor of Science in Chemistry

1956-1959 Jefferson Senior High School, Roanoke, VA.
Academic Diploma

PROFESSIONAL AND RELATED EXPERIENCES

12/92- Division Superintendent, Gloucester County Public Schools, Gloucester, VA.

7/87-12/92 Executive Superintendent, Northern Neck Regional Special Education Program, Heathsville, VA.

7/82-12/92 Division Superintendent, Northumberland County Public Schools, Heathsville, VA.

7/79-7/82 Principal of Northumberland Middle School in combination with the principalship of Northumberland High School, Heathsville, VA.

7/75-7/82 Principal of Northumberland High School, Heathsville, VA.

7/73-7/75 Assistant Principal, Hermitage High School, Henrico County Public Schools, VA.

10/72-7/73 Administrative Intern, Hermitage High School, Henrico County, VA.

9/72-10/72 Teacher -- Chemistry, Physical Science, Hermitage High School, Henrico County, VA.

9/64-6/72 Teacher -- Chemistry, Huguenot High School, Chesterfield County (1964-1970), Richmond City (1970-1972), VA.

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J. Larry Hoover