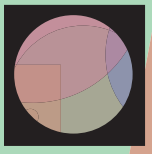


Prepared by
Learning Quest
on 10/15/2003

LoTi℠ Technology Use Profile

State of New Hampshire

Introduction

* During the 2002-2003 school year, a technology use profile was conducted for the State of New Hampshire to create baseline data as to the current level of technology implementation in schools throughout the state. Such information will enable all stakeholders to target funding sources and provide professional development opportunities directed at moving the State of New Hampshire's educators to a higher level of technology implementation in the classroom, and in doing so, better prepare students for the challenges facing them in a highly competitive, technology-oriented society.
* A 50 item survey referred to as the Level of Technology Implementation (LoTi) Questionnaire was administered to 5,889 participants from the State of New Hampshire. A separate version of the LoTi Questionnaire was administered to five different groups in the State of New Hampshire: Inservice Teachers, Preservice Teachers, Higher Education Faculty, Media Specialists, and Building Administrators.
* The State of New Hampshire selected the nationally-validated LoTi assessment instrument to help answer the following questions surrounding technology acquisition and use in the county:
    1. What is the State of New Hampshire's current level of technology implementation profile statewide?
    2. What areas of professional development should the State of New Hampshire focus on to ensure the best possible teaching and learning with technology?
    3. What interventions have contributed the greatest impact to teachers using technology (e.g., computers) in the classroom?
* The LoTi Technology Use Profile focused on the use of technology as an interactive learning medium because this particular component has the greatest and lasting impact on classroom pedagogy and is the most difficult to implement and assess. The questionnaire generated a profile for each respondent in three domains: Level of Technology Implementation (LoTi), Personal Computer Use (PCU), and Current Instructional Practices (CIP). The Level of Technology Implementation (LoTi) profile approximated the degree to which each respondent was either implementing technology (i.e., computers) into the curriculum (i.e., inservice teacher, higher education faculty, preservice teacher) or modeling/supporting the implementation of technology (i.e., building administrator, media specialist). The Personal Computer Use (PCU) profile addressed each respondent's comfort and proficiency levels with using computers. The Current Instructional Practices (CIP) profile revealed each respondent's inclination toward instructional practices consistent with either a subject-matter or learner-based curriculum design.

Introduction

* The creation of the LoTi Questionnaire and the identification of a LoTi profile for individual teachers, instructional specialists, preservice teachers, media/technology specialists, and building administrators were based primarily on the work of Moersch (1995) and his identification of specific levels of technology implementation (see Table 1). These levels range from Nonuse (Level 0) to Refinement (Level 6). As a classroom teacher progresses from one level to the next (Level 3 to Level 4) of the LoTi framework, a corresponding series of changes to the instructional curriculum is observed. The instructional focus shifts from a teacher-centered to a learner-centered orientation while the use of computers shifts from an emphasis on isolated uses (i.e., drill & practice applications) to an expanded view of technology as a process, product, and tool to augment and enhance students' critical thinking and help them find viable solutions to real world problems (see Table 2).

Introduction

Table 1: The Levels of Technology Implementation (LoTi) Framework

Level O - Nonuse
Technology-based tools (e.g., computers) are either (1) completely unavailable in the classroom, (2) not easily accessible by the classroom teacher, or (3) there is a lack of time to pursue electronic technology implementation. Existing technology is predominately text-based (e.g., ditto sheets, chalkboard, overhead projector).

Level 1 - Awareness
The use of technology-based tools is either (1) used almost exclusively by the classroom teacher for classroom and/or curriculum management tasks (e.g., taking attendance, using grade book programs, accessing email), (2) used to embellish or enhance teacher-directed lessons or lectures (e.g., multimedia presentations) and/or (3) is one step removed from the classroom teacher (e.g., integrated learning system labs, special computer lab pull-out programs, central word processing labs).

Level 2 - Exploration
Technology-based tools supplement the existing instructional program (e.g., tutorials, educational games, basic skill applications) or complement selected multimedia and/or web-based projects (e.g., internet-based research papers, informational multimedia presentations) at the knowledge/comprehension level. The electronic technology is employed either as extension activities, enrichment exercises, or technology-based tools and generally reinforces the content under investigation.

Level 3 - Infusion
Technology-based tools including spreadsheet and graphing packages; multimedia and desktop publishing applications; and the internet complement selected instructional events or multimedia/web-based projects at the analysis, synthesis, and evaluation levels. Though the learning activity may or may not be perceived as authentic by students, emphasis is placed on using a variety of thinking skill strategies (e.g., problem-solving, decision-making, experimentation, scientific inquiry) to address the content under investigation.

Level 4a - Integration (Mechanical)
Technology-based tools are integrated in a mechanical manner that places heavy reliance on prepackaged materials, outside resources, and/or interventions that aid the teacher in the daily management of their operational curriculum. Technology is perceived as a tool to identify and solve authentic problems as perceived by the students relating to an overall theme/concept. Emphasis is placed on student action and/or on issues resolution that requires higher levels of cognitive processing and in-depth examination of the content.

Level 4b - Integration (Routine)
Technology-based tools are integrated in a routine manner whereby teachers can readily design and implement learning experiences (e.g., units of instruction) that empower students to identify and solve authentic problems relating to an overall theme/concept using the school's available technology with little or no outside assistance. Emphasis is placed on student action and/or on issues resolution that requires higher levels of student cognitive processing and in-depth examination of the content.

Level 5 - Expansion
Technology access is extended beyond the classroom. Teachers actively elicit technology applications and networking from outside sources to expand student experiences directed at problem-solving, issues resolution, and student activism. The complexity and sophistication of the technology-based tools used are now commensurate with (1) the diversity, inventiveness, and spontaneity of the teacher's experiential-based approach and (2) the students' level of complex thinking and in-depth understanding of the content at hand.

Level 6 - Refinement
Technology is perceived as a process, product, and/or tool for students to find solutions related to an identified "real-world" problem or issue of significance to them. Technology provides a seamless medium for information queries, problem-solving, and/or product development. The classroom content emerges based on the needs of the learner according to his/her interests, needs, and/or aspirations and is supported by unlimited access to the most current computer applications and infrastructure available.

Introduction

Table 2: Stages of Instructional Practices

Element	***Stage 1***	***Stage 2***	***Stage 3***
Content	Content organized and delivered by traditional scope & sequence; Focus on teacher-based questions	Concepts and processes organized and presented based on the interests of the teacher and/or the learner	Concepts and processes emerge based on the needs of the learner; Focus on learner-based questions
Learning Materials	Organized by the content; heavy reliance on sequential instructional materials	Emphasis on hands-on investigations and predefined problem solving strategies	Determined by the problem areas under study, extensive and diversified resources
Learning Activities	Traditional verbal activities; problem solving activities (e.g., worksheets; story problems)	Emphasis on student's active role; problem solving strategies with little or no connection to a broad concept or theme (e.g., verification lab from a science kit)	Emphasis on student activism and issues investigations and resolutions; authentic hands-on inquiry related to a problem under investigation; focus on experiential learning
Teaching Strategies	Expository approach	Facilitator; resource person	Co-learner/facilitator
Evaluation	Traditional evaluation practices including multiple-choice, short answer, and true/false questions	Uses multiple assessment strategies including performance tasks, and open-ended and problem-based questions	Multiple assessment strategies integrated authentically throughout the unit and linked to the problem/concept; use of portfolios, open-ended questions, performance tasks, self-analysis, and peer review
Technology	Drill & practice computer-based programs (e.g., integrated learning systems), computer games; little connection between technology use and overall concept/topic	Technology integrated into isolated hands-on experiences (e.g., tabulating and graphing data to analyze a survey or experiment; information searches using the Internet/CD-ROM)	Expanded view of technonlgy as a process, product, and tool to find solutions to authentic problems, communicate results, and retrieve information (e.g., spreadsheets, graphs, probes, databases, CD-ROM-based simulations, Web page development)

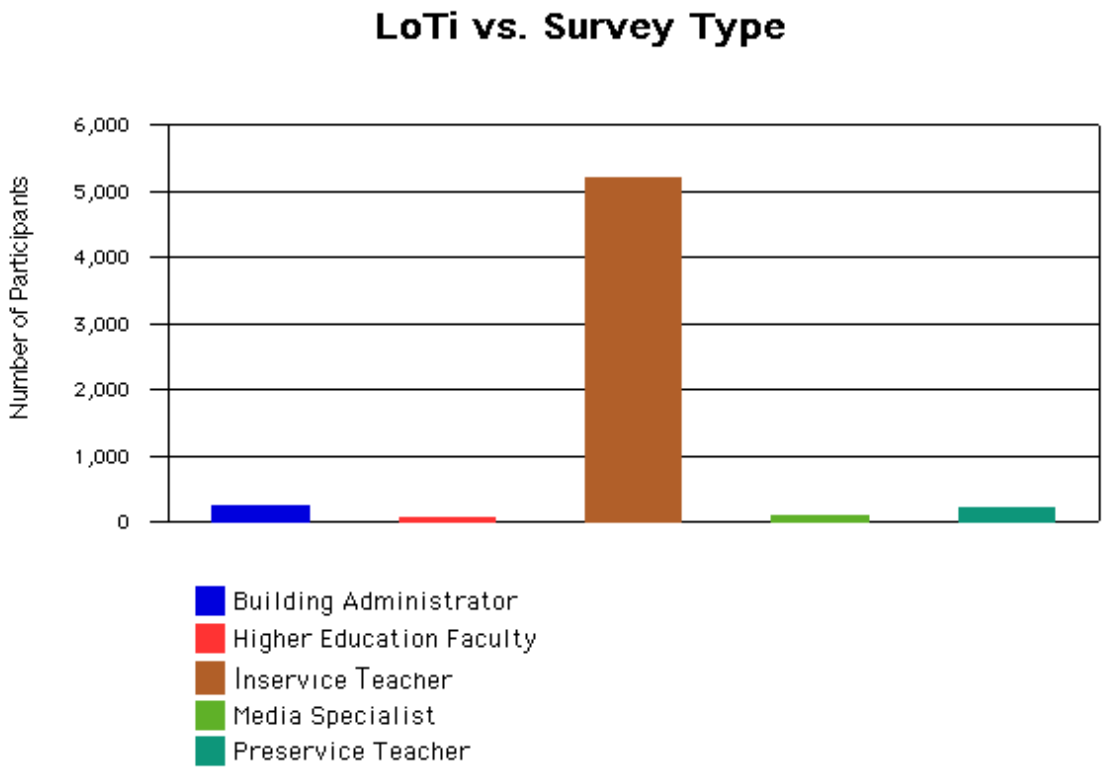
Introduction

* Current research has found strong links between student academic achievement and the manner in which technology is used in the classroom. According to the National Assessment of Educational Progress (NAEP) study (1998), eighth grade students whose teachers used computers primarily for higher order thinking performed better on NAEP than students whose teachers did not. Conversely, eighth grade students whose teachers used computers primarily for "drill and practice"— generally associated with lower order thinking skills — performed worse. Still, the majority of the research findings point to the teacher's role in the instructional planning process as the most important element in promoting student higher order thinking. Many of these studies investigating technology use practices and student performance (e.g., Flescher, 1997; Archer, 1998; Alvarez, 1998; Oliver, 1999; and Wiburg and Carter, 1994) discuss the importance of emergent curricula that engage students in meaningful ways as essential factors tied to student demonstration of higher order thinking.
* The LoTi Questionaire was created for the purpose of assessing classroom practices tied to higher order thinking skills and relevant, engaging curricula. The LoTi Questionaire enables decision-makers to determine how all stakeholders at the school building level (e.g., inservice teachers, building administrators, media specialists, higher education faculty, preservice teachers) are either implementing or supporting the use of technology tied to powerful teaching and learning opportunities directed at student achievement.
* As used in this report, the term, technology, embraces a wide variety of hardware and software applications used in the classroom including hand-held computers, calculators, digital/video cameras, desktop computers, and digital white boards. The information provided in this report was based exclusively on the perceptions of the staff who participated in the survey. A total of 5,889 staff members from the State of New Hampshire completed the Level of Technology Implementation (LoTi) survey. The subsequent data analysis including all findings, goals, and recommendations are based on these returns.

LoTi Profile

* Figure 1 compares the number of participants who completed the LoTi survey by Survey Type throughout the State of New Hampshire. Based on their responses, 89% of participants (5,212 participants) were Inservice Teachers compared to 3% Preservice Teachers (212 participants), 1% Higher Education Faculty (82 participants), 2% Media Specialists (116 participants), and 5% Building Administrators (267 participants).

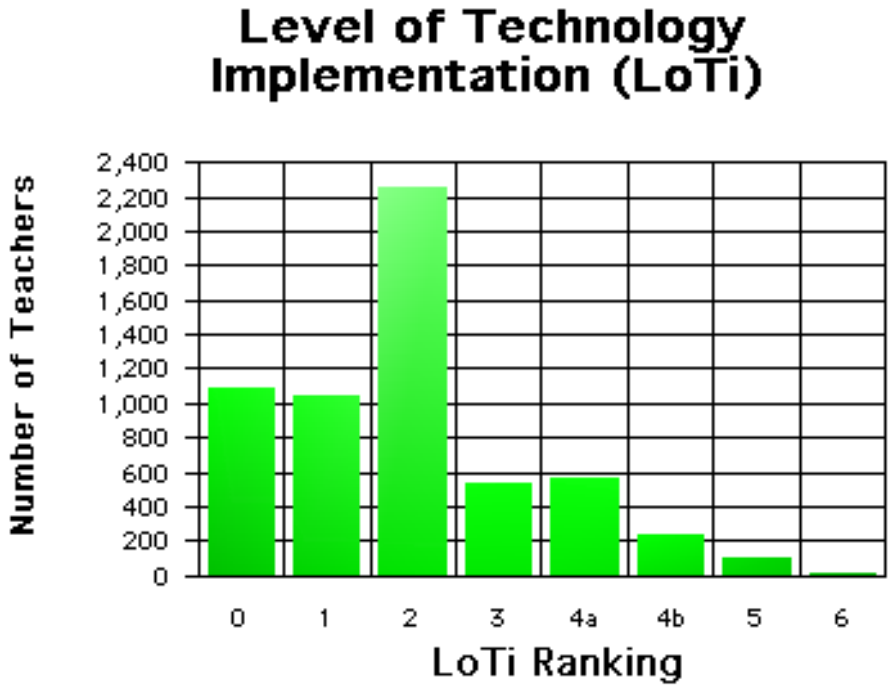
Figure 1



LoTi Profile

* Figure 2 compares the Level of Technology Implementation (LoTi) ranking for the 5,889 participants throughout the State of New Hampshire. The LoTi profile approximates the degree to which each participant is implementing or supporting the implementation of computers into the curriculum. Based on their responses, the predominate level of technology implementation was at a Level 2 (Exploration) in the State of New Hampshire .
* A Level 2 implies technology-based tools supplement the existing instructional program (e.g., tutorials, educational games, basic skill applications) or complement selected multimedia and/or web-based projects (e.g., internet-based research papers, informational multimedia presentations) at the knowledge/ comprehension level. The electronic technology is employed either as extension activities, enrichment exercises, or technology-based tools and generally reinforces the content under investigation.

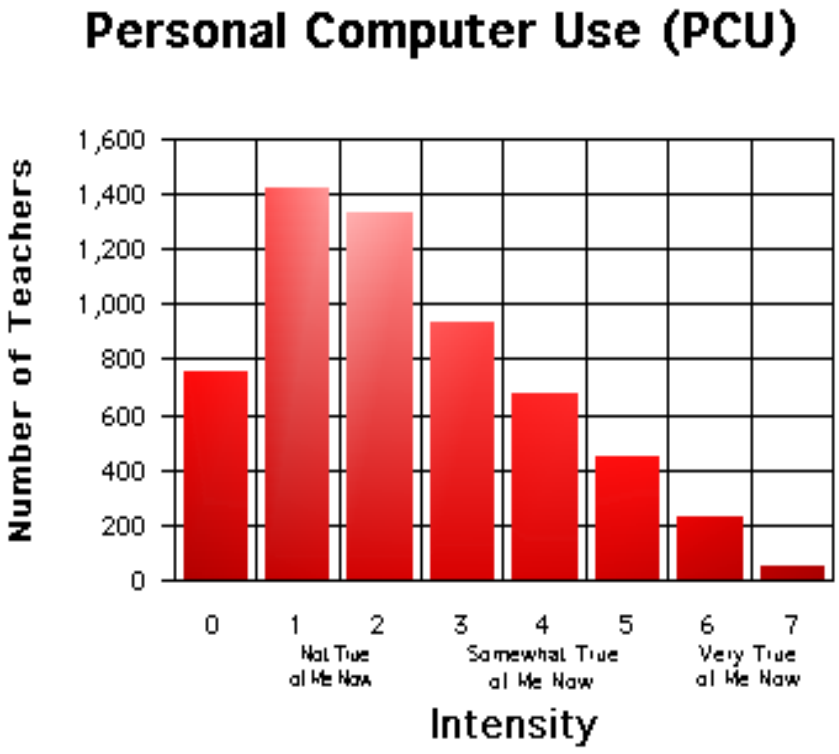
Figure 2



LoTi Profile

* Figure 3 displays the Personal Computer User (PCU) ranking for the 5,889 respondents throughout the State of New Hampshire. The PCU profile addresses an individual's comfort and proficiency level with using computers (e.g., troubleshooting simple hardware problems, using multimedia applications). During the 2002-2003 school year, the predominate intensity level ranking for the 5,889 respondents from the State of New Hampshire was in the "Not True of Me Now" range (Intensity Level 1) regarding their ability to either use basic software applications, troubleshoot routine computer problems, or use computers routinely in the workplace.
* A PCU Intensity Level 1 indicates that the participant demonstrates little skill level with using computers for personal use. Participants at Intensity Level 1 may have a general awareness of various technology-related tools such as word processors, spreadsheets, or the internet, but generally are not using them.

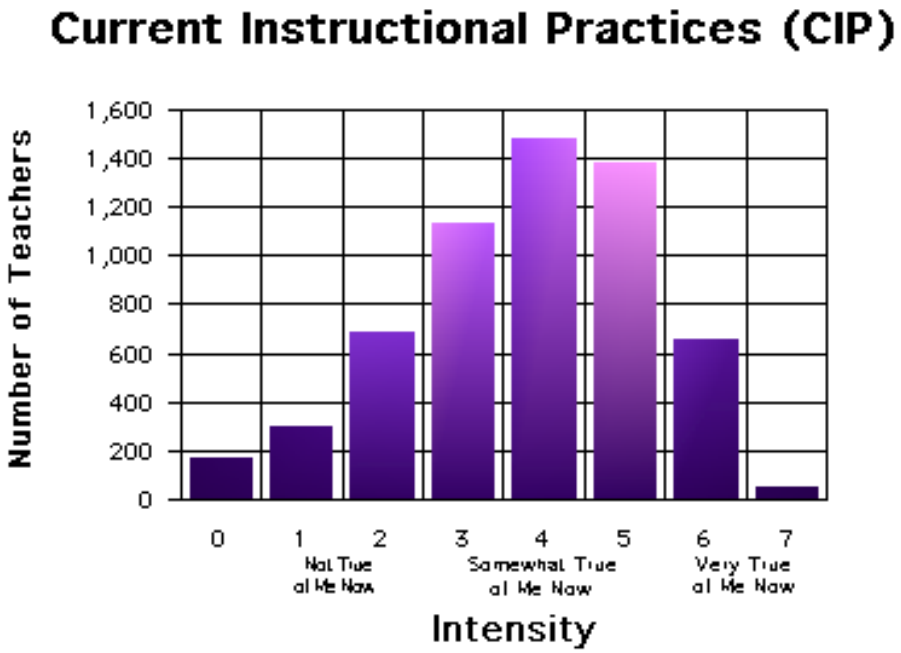
Figure 3



LoTi Profile

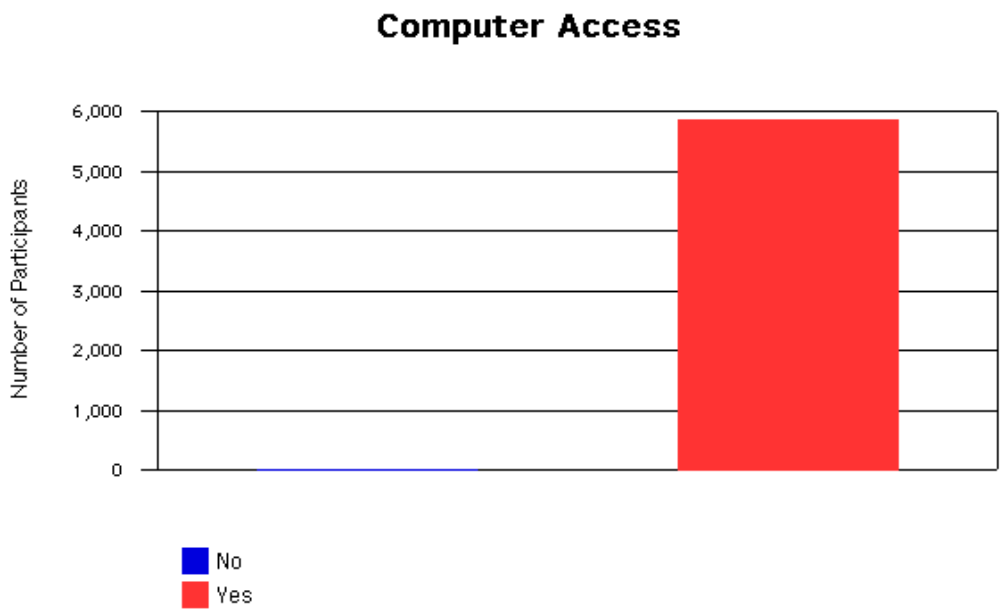
* Figure 4 displays the Current Instructional Practices (CIP) profile for the 5,889 respondents throughout the State of New Hampshire during the 2002-2003 school year. The CIP profile reveals the participant's inclination toward instructional practices consistent with a learner-based curriculum design (e.g., learning materials determined by the problem areas under investigation, multiple assessment strategies integrated authentically throughout the curriculum, teacher as co-learner/facilitator, focus on learner-based questions). During the 2002-2003 school year, the predominate intensity level for the 5,889 participating staff members from the State of New Hampshire was in the "Somewhat True of Me Now" range (Intensity Level 4) regarding their use of a learner-based versus a subject-matter based curriculum approach.
* At a CIP Intensity Level 4, the participant may feel comfortable supporting or implementing either a subject-matter or learning-based approach to instruction based on the content being addressed. In a subject-matter based approach, learning activities tend to be sequential, student projects tend to be uniform for all students, the use of lectures and/or teacher-directed presentations are the norm as well as traditional evaluation strategies. In a learner-based approach, learning activities are diversified and based mostly on student questions, the teacher serves more as a co-learner or facilitator in the classroom, student projects are primarily student-directed, and the use of alternative assessment strategies including performance-based assessments, peer reviews, and student reflections are the norm.

Figure 4



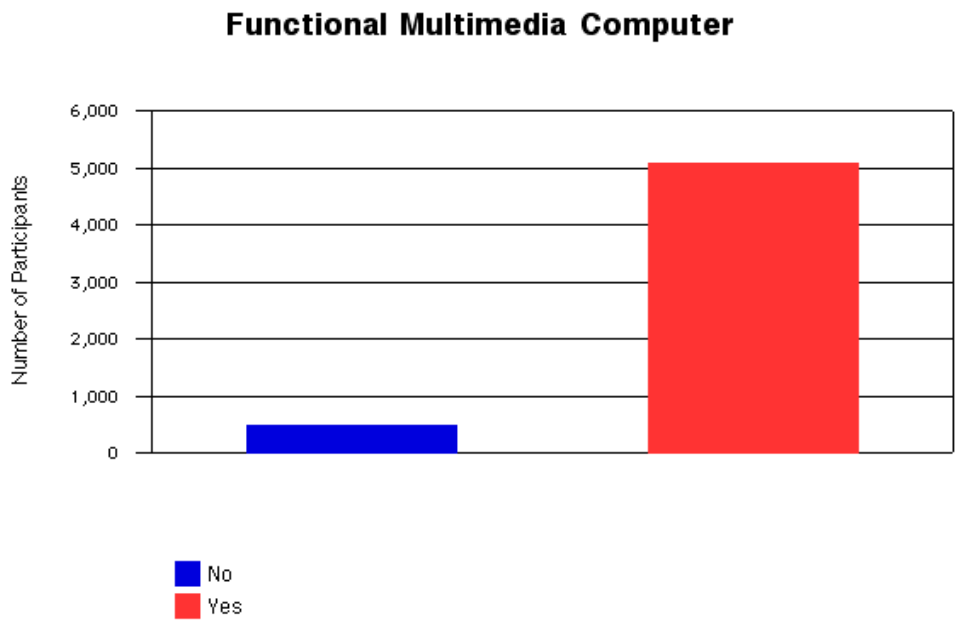
* Figure 5 exhibits the number of participants who indicated they had access to computers. Computer access means that students and teachers can use computers within the school building for instructional purposes; including classroom computers, computer labs, computers on carts, general access computers in the library or something similar. The graph shows that approximately 100% of participants (5,872 respondents) indicated they had access to computers for instructional use.

Figure 5



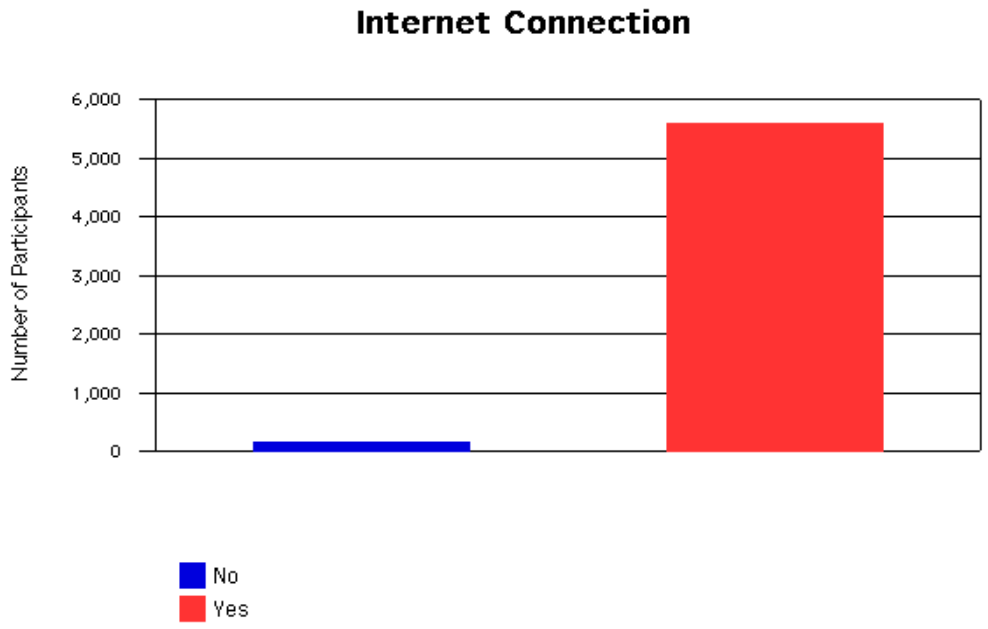
* Figure 6 exhibits the number of respondents throughout the State of New Hampshire with a functional multimedia computer in their respective classrooms. The graph shows that approximately 87% of participants (5,102 respondents) indicated they did have a functional multimedia computer in their classroom for instructional purposes.

Figure 6



* Figure 7 exhibits the number of respondents throughout the State of New Hampshire with internet access in their respective classrooms. The graph shows that approximately 95% of participants (5,604 respondents) indicated they did have access to the internet in their classroom for instructional purposes.

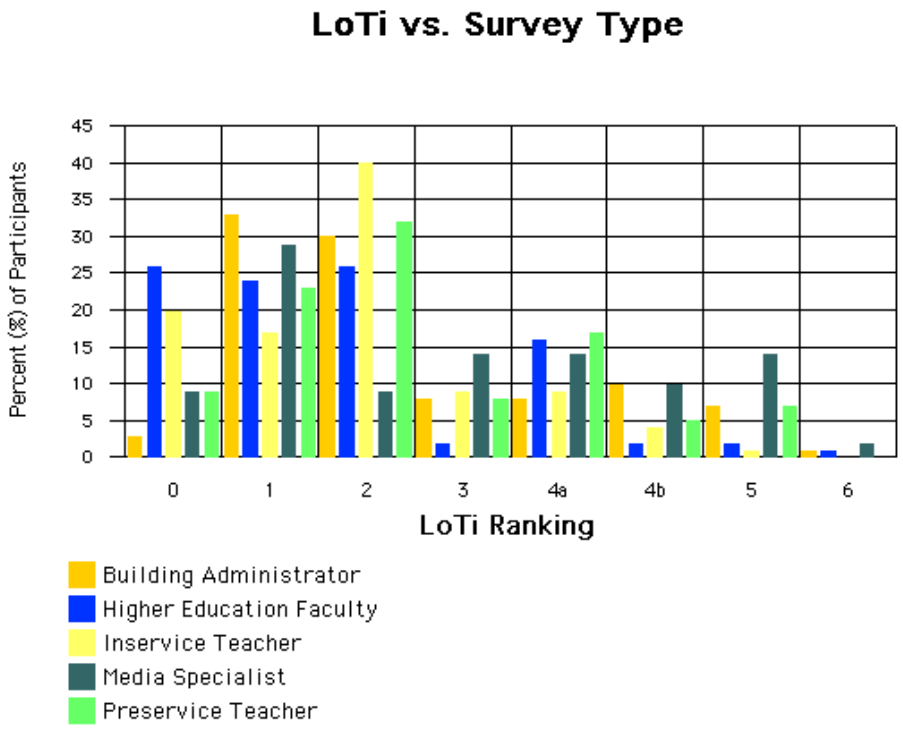
Figure 7



LoTi Profile

* Figure 8 compares the percentage of respondents positioned at each of the LoTi Levels throughout the State of New Hampshire during the 2002-2003 school year according to Survey Type. The graph shows that the predominate LoTi Level for Inservice Teachers and Preservice Teachers was LoTi Level 2 (Exploration) while Media Specialists and Building Administrators had a predominate LoTi Level 1 (Awareness). Higher Education Faculty shared a predominate LoTi Level 0 (Nonuse) and LoTi Level 2 (Exploration).

Figure 8



LoTi Findings

* Approximately 6% of the State of New Hampshire participants completing the Level of Technology Implementation (LoTi) Questionnaire self-assessed themselves at the Target Technology Level as defined by the National Education Technology Standards (NETS) and Technology Standards for School Administrators (TSSA). This level is characterized by technology use embedded in challenging and engaging learning experiences that promote problem-solving, critical thinking, and self-directed learning.
* Approximately 75% of the 5,889 State of New Hampshire participants were clustered in Levels 0 through 2. These levels represent the lower portion of the LoTi Framework (see page 4) and focus primarily on teacher's use of productivity tools, student use of tutorial programs, and "project-based" learning opportunities at the knowledge/comprehension level.
* Though 100% of the State of New Hampshire participants reported having instructional access to computers for teacher and student use, only 87% indicated that they possessed a functional multimedia computer for classroom use.
* Approximately 49% of the State of New Hampshire educators who participated in this study felt comfortable using computers at home and in the workplace (e.g., accessing email, creating multimedia products, troubleshooting computer problems).
* Approximately 86% of the State of New Hampshire educators indicated that they either supported or implemented one or more attributes of a learner-centered curriculum with or without a computer. A learner-centered curriculum includes attributes such as a focus on multiple assessment strategies, an emphasis on higher order thinking skills, and the creation of a problem-based learning environment. Research has found strong links between computers used in conjunction with these attributes and higher student achievement based on standardized test scores.
* The predominate LoTi level for inservice and pre-service teachers was higher than the predominate level for building administrators in the state.

LoTi Findings

Participants at LoTi Level 0 There is no visible evidence of computer access or instructional use of computers in the classroom.	19% (1,109 participants)
Participants at LoTi Level 1 Available classroom computer(s) are used primarily for teacher productivity (e.g., email, word processing, grading programs).	18% 1,052 participants)
Participants at LoTi Level 2 Student technology projects (e.g., designing web pages, research via the internet, creating multimedia presentations) focus on the content under investigation.	38% (2,254 participants)
Participants at LoTi Level 3 Tool-based applications (e.g., graphing, concept-mapping) are primarily used by students for analyzing data, making inferences, and drawing conclusions.	9% (543 participants)
Participants at LoTi Level 4a The use of outside resources and/or interventions aid the teacher in developing challenging learning experiences using available classroom computers.	10% (568 participants)
Participants at LoTi Level 4b (Target Technology Level) Teachers can readily design learning experiences with no outside assistance that empower students to identify and solve authentic problems using technology.	4% (246 participants)
Participants at LoTi Level 5 Teachers actively elicit technology from outside entities to expand student experiences directed at problem-solving, issues resolution, and student action.	2% (102 participants)
Participants at LoTi Level 6 Computers provide a seamless and almost transparent medium for information queries, problem-solving, and/or product development.	0% (15 participants)
Participants indicating they HAVE access to computers for instructional purposes	100% (5,872 participants)

Recommendations for the Current School Year

* One could make the argument that a "Digital Divide" does exist in classrooms throughout the State of New Hampshire School District, but not as it relates to access, availablity, and utilization of hardware and software. The digital divide resulting from this study focuses on the manner in which technology is not being used in the district to address specific content standards. The fact that approximately 75% of the respondents "self-assessed" themselves at Levels 0-2 while only 6% self assessed themselves at the Target Technology Level should signal a concern as well as a need to reassess existing districtwide professional development practices, mentoring opportunities, and methods of evaluating acceptable use of technology in the classroom. Provided below are recommendations consistent with this study's findings.
* Provide staff development that models specific strategies and techniques for integrating higher-order thinking skills with the available classroom computers using tool-based applications (e.g., spreadsheets, graphs, multimedia, databases, concept-mapping, internet tools). This recommendation is targeted at moving participants to Level 3 relating to their level of technology implementation.
* Provide staff development that increases participants confidence and competence with designing Level 4b (Target Technology) instructional modules using a constructivist, experiential-based approach to curriculum development. This recommendation is targeted at (1) moving participants to a Level 4a implementation of technology, (2) improving the perceptions of Level 4a participants regarding their ability to support or integrate technology at a Level 4a, and (3) moving participants to a Level 4b relating to their level of technology implementation.
* Review existing districtwide professional development programs in light of the results from this study. Currently, 75% of the survey participants self-assessed themselves at Levels 0-2, yet close to 82% of these same participants indicated that they were implementing one or more of the attributes of a learner-centered curriculum. It is respectfully recommended that stakeholders consider new approaches and/or modify existing approaches to districtwide professional development so that educators can make better connections between technology use and student authentic problem-solving in the classroom. This recommendation is targeted at moving Level 1 and 2 survey participants to Level 3.
* Provide professional development opportunities for building administrators to promote, model, and facilitate technology implementation practices consistent with the higher levels of technology implementation (LoTi Levels 3 and above). Currently, the LoTi level for building administrators in the State of New Hampshire is lower than the predominate LoTi level of both inservice and pre-service teachers in the state.

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