

# Technology Trends Reflected in Educational Technology Students' Master's Projects at the University of Hawai'i

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## Abstract

*Recent studies undertaken by twenty-five graduate students enrolled in the Department of Educational Technology at the University of Hawai'i were examined to identify current issues regarding technology in education that are of concern. Relationships between the ten issues that emerged with those identified at a national level are presented to offer one perspective on technology trends in Hawai'i for educators.*

## Introduction

As the ratio of technological to traditional approaches increases exponentially in all aspects of living, what is the specific effect on education? Even more specifically, what technological trends might educators in Hawai'i expect? An examination of twenty-five studies undertaken in the field of educational technology—a field that emphasizes systematic needs analyses and development and assessment of instructional processes and products—offers one vision of the future, presented here in relation to views described by other researchers.

The Department of Educational Technology (ETEC) is administratively situated within the College of Education at the University of Hawai'i at Manoa. Its students engage in graduate studies in designing, delivering and evaluating effective instruction. Over a period of two to three years they investigate and apply a wide range of traditional and newer technologies that support learners' attainment of specified learning outcomes. Investigations these graduate students develop and carry out for their master's projects allow them to focus on discrete aspects of the teaching and learning process. Frequently, they examine the role that one or more newer technologies plays as a part of this process. Work carried out over the past five years by twenty-five ETEC graduate students offers a view of issues that predominate not only in the state, but also reflect national concerns about technology in schools. Ely (1996) acknowledges that noting such trends allows future directions to be indicated.

While these ETEC studies could be described as encompassing a variety of themes, the coding followed the scheme devised by Ely (1996) during his identification of topics in the field of educational technology for his studies of occurrences of these subjects in relevant, high ranking scholarly journals and notable publications. Like the Ely analysis, each ETEC students' project was examined and categorized according to two main emergent themes. Twenty-five studies, spanning the years 1992-1997, were available for the content analysis.

Although abstracts were read three times to confirm identified categorizations, it is recognized that subsequent reviews may result in some adjustments to coding decisions. Selecting only two themes for studies that frequently involve needs analysis, selection of one or more instructional strategies, and various evaluation schemes while often focusing on a specific type of learner or medium, pose coding challenges to any reviewer. The emergent themes are presented in Table 1 to provide an overview of perspectives these ETEC students offer to the field. Each project appears in the listing twice to express the two major themes identified for each study.

## Trends

Trends suggests from the work of these twenty-five students mirror many of those cited by Ely (1996) and Molenda, Russell and Smaldino (in press).

**Trend 1: A strong interest exists in interactive learning, particularly in relation to web-based delivery of instruction.**

A pervasive interest is seen for investigating interactive learning from newer technologies. The majority of these studies related to interactive learning involve desktop multimedia modules (Chun, 1995, Chun, 1997; Hines, 1997; Pong, 1997; Tomita, 1994, Uehara, 1997). The work of Steiner (1997) and Shea (1997) reflects the developing interest in web-based delivery of instruction. Shea (1997) focused on the influence of web-delivered quizzes for review purposes by college students. Steiner (1997) gathered in depth data on the ways mothers and preschoolers used hardware, software and on screen features during their web explorations.

Nakasone (1995) and Stanley (1995), on the other hand, instructed educators on the development of a Local Area Network and on procedures for transferring files respectively. Kimura (1994) made all aspects of telecommunications needs one of the two areas she examined in her middle school needs assessment. Both Ely (1996) and Molenda, Russell, and Smaldino (in press) identify the growth of network and new delivery systems as notable trends.

**Trend 2: There is a relatively balanced interest on formal research in the field of educational technology in terms of instructional designs that use computer-mediated approaches and those that use more traditional media, particularly video, as part of the treatment.**

**Educational Technology Master's Students' projects (1992-1997) in Relation to Themes in Scholarly Works in Educational Technology**  
**Table 1**

| Instructional Process  | Technical Developments  |
|--|---|
| <p><b>Interactive Learning*</b></p> <p>Chun, K.—Multimedia Instruction in Kite Aerodynamics: Why Does a Kite Fly?<br/>           Chun, L.—Introducing Multimedia to the Hawaiian Language Immersion Program<br/>           Hines—Student Authoring and Learning in Hypermedia Environments<br/>           Peterson—Providing CAI Feedback at Intervals and Retention<br/>           Pong—An Exemplary Perspective for Selecting Media<br/>           Shea—World Wide Web Practice Quizzes: Development and College Student Usage Observations<br/>           Siu—How Effective is Logo in Enhancing Learning of Geometry for Fourth Graders?<br/>           Steiner—On the World Wide Web before Kindergarten: A Case Study of Pre-School Web Usage<br/>           Tomita—Computer Assisted Instruction on Color and Balance<br/>           Uehara, R.—Genetics for Nurses: Constructing and Interpreting Pedigrees</p>  | <p><b>Computer Related*</b></p> <p>Chun, K.—Multimedia Instruction in Kite Aerodynamics: Why Does a Kite Fly?<br/>           Ranada—Archiving and Distributing Instructional Resources on CD-ROM: A Case Study on the Production of Hawai'i: The Coastal Zone</p> <p><b>Telecommunications</b></p> <p>Kimura—Technological and Telecommunications Needs of a Middle School<br/>           Nakasone—Developing a Class Module on Local Area Networks in Education Using the Instructional Design Process<br/>           Shea—World Wide Web Practice Quizzes: Development and College Student Usage Observations<br/>           Steiner—On the World Wide Web before Kindergarten—A Case Study of Pre-School Web Usage<br/>           Stanley—From the Global Highway to Your Desktop: Curriculum and the Internet</p> <p><b>Multimedia*</b></p> <p>Eichelberger—Student Portfolio Programs for Educational Technology's Media in Education Course<br/>           Tomita—Computer Assisted Instruction on Color and Balance</p> <p><b>Video</b></p> <p>Brainerd—Instructional Strategies for Video<br/>           Belcher—The Relationship between Performance Achievement Levels on Complex Psychomotor Tasks and Exposure to Post-Practice Feedback<br/>           Ige—Effects of Topic Sequencing on Comprehension and Performance in Teaching Statistics<br/>           Uehara, N.—Can Video Motivate?<br/>           Wu—Strategies for Using Videos in the ESL Classroom</p> <p><b>Research and Theory*</b></p> <p>Belcher—Relationship Between Performance Achievement Levels on Complex Psychomotor Tasks and Exposure to Post Practice Feedback<br/>           Hines—Student Authoring and Learning in Hypermedia Environment<br/>           Ige—Effects of Topic Sequencing on Comprehension and Performance in the Teaching of Statistics<br/>           Peterson—Providing CAI Feedback at Intervals and Retention<br/>           Sasaki—Effect of Preparation on Student Performance on the California Achievement Test</p> <p><b>Personnel: Professional</b></p> <p>Gima—The Availability and Estimated Use of Instructional Media in Hawai'i Public High Schools: A Survey</p> <p><b>Management</b></p> <p>Naito—Survey: College of Education Professional Development Planning Education<br/>           Matsuno—Assessing Computer Needs of a School Using a School/Community-Based Management Approach</p> |
| <p align="center"><b>Design and Development</b></p> <p><b>Needs Assessment*</b></p> <p>Gima—Availability and Estimated Use of Instructional Media in Hawai'i's Public High Schools<br/>           Kimura—Technological and Telecommunication Needs of a Middle School<br/>           Matsuno—Assessing Computer Needs of a School Using a School/Community-Based Management Approach<br/>           Naito—Survey: College of Education Professional Development</p> <p><b>Product Development*</b></p> <p>Brainerd—Instructional Strategies for Video<br/>           Nakasone—Developing a Class Module on Local Area Networks in Education using an Instructional Design Process<br/>           Siu—How Effective is Logo in Enhancing Learning of Geometry for Fourth Graders?<br/>           Wu—Strategies for Using Videos in the ESL Classroom</p> <p><b>Message Design</b> Pong—An Exemplary Perspective for Selecting Media</p> <p><b>Motivational Strategies</b></p> <p>Chun, L.—Introducing Multimedia to the Hawaiian Language Immersion Program<br/>           Eichelberger—Student Electronic Portfolio Program for Educational Technology's Media in Education Course<br/>           Okino—Students' Opinions About Performance Evaluation Checklists<br/>           Uehara, N.—Can Video Motivate?</p> | <p><b>Evaluation</b></p> <p><b>Product Evaluation*</b></p> <p>Okino—Students' Opinions About Performance Evaluation Checklists<br/>           Ranada—Archiving and Distributing Instructional Resources on CD-ROM: A Case Study on the Production of Hawai'i: The Coastal Zone<br/>           Sasaki—Effect of Preparation on Student Performance on the California Achievement Test<br/>           Uehara, R.—Genetics for Nurses: Constructing and Interpreting Pedigrees Process Evaluation*<br/>           Stanley—From the Global Highway to Your Desktop: Curriculum and the Internet</p>   |
| <p><small>* Encompassed within the top ten themes identified by Ely in 1991 and 1995.</small></p>  | <p><small>Note: Each study is listed twice to reflect the two main categories it entails.</small></p>   |

The continued design of many traditional research studies to include one type of medium as either the object of the investigation, or use the medium as part of the treatment, shows the ongoing quest for a better understanding of aspects of mediated learning. Belcher (1992) employed video in his comparison study of the relationship between performance achievement levels on the effect of traditional verbal feedback and verbal feedback supplemented with video playback of the practice performances of first year medical students that occurred immediately following their practice clinical examinations. He found support for the design and application of instructional feedback strategies in the teaching of these complex psychomotor tasks, along with indications that video is a feasible technique for such a process.

While Sasaki (1993) found no significant differences for selected mediated and non-mediated approaches with college students who were preparing for a standardized test, Hines' (1997) found indications that multimedia could support high school students' grasp of a difficult to learn science concept as well as the more traditional method of a research paper. Peterson (1993) noted that the pacing of feedback in a multimedia module he designed to supplement instruction for pre-service teachers on writing performance objectives could vary without affecting learning. Such work contributes to the developing body of knowledge about learning with multimedia. More importantly, questions are also raised about how to measure learning in such an enriched environment.

Kozma (1994) suggests the question is not whether media influence learning, but because it is difficult to separate the way that information is displayed, received and transformed by media, that all these elements be examined. He urges that studies about the effects of media combine analytic approaches, such as, tracking eye movement, recording "talk-aloud" comments with systematic approaches, such as, creating ethnographs and making prolonged observations. Rediscovering instructional design through formal investigations of its application—particularly in regard to a constructivist pedagogy is emerging—according to Molenda, Russell, and Smaldino (in press).

**Trend 3: Interest in product development emphasizes computer-based approaches to learning, while simultaneously developing ways for educators to design effective approaches to using the more common medium of video**

Siu (1994) reflects the ongoing interest in the computer language, **Logo**, in her design for enhancing fourth grade students' geometry learning through their active involvement with an approach that combines a textbook, **Logo**, and learning activities. Nakasone's (1995) design for a module

that combines instructor and print-based instruction improved adults' knowledge of networks in education through the clear, concise manner in which both delivered the information. Uehara's (1997) adult learners—nurses—were able to construct, identify, and make decisions about building and interpreting pedigrees—a complex scientific concept. They acknowledged the importance of this subject matter and expressed a desire to learn more about the topic from the multimedia module Uehara designed. Both Ely (1996) and Molenda, Russell and Smaldino (in press) view computer accessibility as impacting mainstream education.

Brainerd's guide to video strategies for educators (1996) and Wu's print and multimedia guide on video production strategies for ESL teachers in Taiwan (1997) serve as reminders of the ongoing need to maximize educators' use of more traditional media, such as video.

**Trend 4: Systematic assessment of needs for basic and newer technologies offers a foundation for planning for technology in education regardless of the level the educational institution serves.**

Needs of personnel at educational sites ranging from an elementary school to a university have been examined by ETEC students. Such analyses identify needs for instructional media (Gima, 1992), technology and telecommunications (Kimura, 1994), computers (Matsuno, 1993), and technology training for professional development (Naito, 1995), as well as describe the educational setting at the elementary school (Matsuno, 1993) and the university (Naito, 1995). From the elementary level (Matsuno, 1993), to middle school (Kimura, 1994), to high school (Gima, 1992) to college (Naito, 1995), planning for technology is supported by assessing current and future needs.

**Trend 5: Formative evaluation of traditional and newer technological products offers unique insights into the viability of the product and/or process**

ETEC students working within a higher education setting, when evaluation of technological products was emphasized, saw adult learners revealing insights that only intended users can provide. Okino (1996) found that amount of experience using a traditional medium—checklists—as guides for media production, did not significantly impact opinions about the checklists themselves. Her learners did, however, express positive attitudes toward checklist usage. Sasaki (1993) found that age, ethnicity and gender were factors in standardized test results for entering college students, rather than various test review approaches. Educators offered Ranada (1993) evidence that a CD-ROM, containing content matter unique to Hawai'i and produced

locally with limited resources, would be used in school settings in the State. Educators also showed Stanley (1995) that their need for succinct, timely training on features of on-line resources appear to be met with systematically designed instruction that combines face-to-face and on-line instruction supported by on-line discussions. Molenda, Russell and Smaldino (in press) recognize that experimentation, particularly for multimedia, is more apt to occur in higher education.

**Trend 6: Developing personal awareness for selecting content matter readily available by newer technologies is critical, particularly for adolescents**

Pong's (1997) identification of the difficulty seventh and eighth grade students had in recognizing subtle messages, but not age and gender biases, in advertisements composed of still images and text highlights the mixed manner in which adolescents interpret messages. Increased efforts in developing visual literacy among this age group has potential to lead such learners toward questioning their reasons for the choices they make when selecting content from readily available media formats, such as mass media and the World Wide Web. The importance of developing this awareness is evident by the prevalence of technology-based learning in homes (Ely, 1996; Molenda, Russell and Smaldino, in press).

**Trend 7: Interest in assembling electronic portfolios is increasing among educators.**

Pre-service teachers in Eichelberger's (1997) study who assembled samples of their media production work into electronic portfolios evidenced a positive attitude toward this process despite its complex and time consuming nature. Electronic portfolios, such as Eichelberger's, offer a means for a type of authentic assessment to which educators are committing (Molenda, Russell and Smaldino, in press).

**Trend 8: In the midst of newer developments, video continues to be an area of interest to educators.**

Although Uehara's (1993) query regarding motivational aspects of video were confounded due to technical and administrative issues that arose during his work, his plan provides an example of the continuing interest in instructional applications of video. Brainerd's (1996) and Wu's (1997), related work on the development of potential strategies for educators to employ when using video production for instructional purposes, as well as Ige's (1997) incorporation of video into his research design for studying topic sequencing with college students, also provide

examples of the ongoing interest toward, and refinement and incorporation of, this more traditional medium by educators. Continued interest in video may be related to the almost universal access provided to video in the schools (Ely, 1996) and the "incorporation of traditional audiovisual media into the instructional mainstream" (Molenda, Russell and Smaldino, in press).

**Trend 9: Traditional media and newer technologies are viewed as having the potential to motivate students**

Chun (1997) recognized that children in the Hawaiian Language Immersion Program (HLIP) had little exposure to electronic media. Obtaining permission to complete the conversion of an existing Hawaiian story into an interactive book, she found indications that the multimedia supported the HLIP students' engagement with the story. Employing traditional media, such as the print format of a checklist (Okino, 1996), or a multimedia book (Chun, 1997), an electronic portfolio (Eichelberger, 1997), or a video on newer technology usage (Uehara, 1993) appear to have potential to inspire students to attend to the material at hand. While not supported by Uehara's study (1993) which had some design problems, the results from the work of the other three showed positive changes in attitudinal dimensions in relation to attention, confidence, relevance and satisfaction. The apparent potential for media and newer technologies to motivate students may explain to some extent the support given to the use of educational technology in the schools by various policy groups (Ely, 1996), as well as offer a possible explanation for the pervasiveness of traditional media in the instructional mainstream (Molenda, Russell and Smaldino, in press).

**Trend 10: Employing traditional media and newer technologies requires ongoing professional education and planning.**

Change, in relation to the constant emergence of newer technologies, characterizes the field of educational technology. Questions about the impact of traditional media are still to be answered as new media appear. In such a climate, the planning process and ongoing education of professional educators is critical (Harrington, 1993; U.S. Department of Education, 1997). The conclusions of Matsuno (1993), after her assessment of the computer needs of one elementary school, exemplifies the need for long-term planning for restructuring and technology use by all who play a role in School/Community-Based Management in order to meet the needs of the learners and teachers. To provide the community with teachers who can work within such changed environments, pre-service teachers need to enter their

profession with baseline knowledge about, and skill in, integrating media and newer technologies into their teaching and learning environments (Larson and Clift, 1996; Northrup and Little, 1996). Such knowledge, further, needs to be supported by attitudes that lead these new teachers to ongoing investigations of the potential that emerging technologies might offer their pupils. The work of Gima (1992) and Naito (1995) suggests that during teacher education preparation, pre-service teachers be exposed to faculty who model these abilities. Planning to ensure that faculty receive the training in technological applications appears to support such ongoing growth. At the national level, support for technologically literate teachers has grown (Ely, 1996, U.S. Dept. of Education, 1997). A corollary is the perception that educational technology can be a key factor for educational reform (Ely, 1996). This possibility is implied in the support given to educational technology since 1995 by the National Education Association (Molenda, Russell and Smaldino, in press).

Ongoing study and developmental endeavors by worldwide researchers and instructional developers in the field of educational technology suggest various traditional and mediated ways for educators to approach the teaching and learning situation. Graduate students enrolled in the Department of Educational Technology at the University of Hawai'i continue their pursuit of contributing to this ongoing endeavor.

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