

Adapting Information and Communication Technologies for Effective Education

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Prefacexiv

Section I Models

Chapter I

Integrating Technology to Transform Pedagogy: Revisiting the Progress of the Three Phase
TUI Model for Faculty Development / *John E. Graham and George W. Semich* 1

In a previous article, the authors illustrated a three-step staff development program for linking technology training with theory to transform pedagogy. Essentially, the model identified three key phases: the training phase, application phase, and the integration phase. The focus of this chapter is to update the research on the three-phase model and to highlight the progress Robert Morris University has made in transforming the teacher-centered classroom into a technology rich, learner-centered environment. This transformation process is explained and illustrated for the reader.

Chapter II

Blended ICT Models for Use in Higher Education / *L. Drossos, B. Vassiliadis,
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Information transfer is a tradition in higher education; in the information transfer model, knowledge is passed from the experts (tutors) to the learners (students) by means of lectures and text books. The hope of increasing the educational impact by using impressive tools based on ICT has the serious disadvantage of increased cost. We argue that new, low-cost educational models based on constructivism can be used in parallel with traditional learning, introducing a blended (or enhanced) learning approach. In such a blended environment, organizational, educational, and technological issues need to be considered as a whole. We introduce a light-weight blended educational model based on cooperation and experimentation. We describe the educational background, introduce a development framework and briefly discuss its quality aspects based on the ISO standard.

Chapter III

The KAR-P-E Model Revisited: An Updated Investigation for Differentiating Teaching and Learning with Technology in Higher Education / *Lawrence A. Tomei* 30

Since 1996, the K-A-RPE model has served to differentiate teaching and learning of technology. It is offered here as an archetype for other institutions seeking to develop their own comprehensive technology program. Knowledge, application, research, practice, and evaluation (K-A-RPE) offer the necessary dichotomy among instructional technology programs for undergraduates, graduates, and doctoral candidates. Similar to other more well-known taxonomies, the K-A-RPE model is progressive and assumes mastery and competency at previous levels. Readers are exposed to the ISTE technology standards for teachers as well as how particular institutions implement the set of competencies in their individual programs of study. By establishing how technology skills are addressed in higher education, readers will be able to transfer the KARPE model to new initiates at all levels of instructional technology education, business, and corporate as well as traditional education.

Chapter IV

Applying the ADDIE Model to Online Instruction / *Kaye Shelton and George Saltsman*..... 41

This chapter assembles the best ideas and practices from successful online instructors and recent literature. Suggestions include strategies for online class design, syllabus development, and online class facilitation, which provide successful tips for both new and experienced online instructors. This chapter incorporates additional ideas, tips, and tricks gathered since it was originally published in the October 2004 issues of the *International Journal of Instructional Technology and Distance Learning* as “Tips and Tricks for Teaching Online: How to Teach Like a Pro!”

Chapter V

TRAKS Model: A Strategic Framework for IT Training in Hierarchical Organizations / *Shirish C. Srivastava and Thompson S. H. Teo* 59

This chapter is an introduction of new information technology (IT) in organizations is a necessary, but not a sufficient, condition for organizational success. The effective adoption and use of IT by organizations is dependent to a large measure on the strategic planning for using the technology, including long-term planning for training the organizational members. Despite the strategic nature of technology training in organizations, most existing studies on technology training address only the operational issues, for example, training needs assessment, learning, delivery methods, and so forth. The strategic concerns of IT training for enhancing business productivity are not largely addressed by the current literature. To address this gap, we explore the strategic role of IT training in hierarchical organizations. We synthesize various ideas in the literature on change management, training needs analysis and IT adoption to evolve a ‘strategic IT training framework’ for hierarchical organizations, namely the TRAKS model. The proposed framework recognizes the differences in IT training requirements for different levels of employees. Further, the model suggests tracking training requirements based on attitudes, knowledge, and skills for different segments of employees and planning training accordingly. The study provides an actionable and comprehensive tool, which can be used for systematically planning IT training for enhancing productivity of organizations.

Section II

Educational Initiatives

Chapter VI

Technology Assisted Problem Solving Packages for Engineering /
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This chapter presents the development of technology-assisted problem solving (TAPS) packages at the University Tenaga Nasional (UNITEN). This project is the further work of the development of interactive multimedia based packages targeted for students having problems in understanding the subject of engineering mechanics dynamics. One facet of the project is the development of engineering mechanics dynamics problems for core undergraduate engineering courses. This chapter discusses the development of an interactive multimedia environment for solving relative motion of a rigid body using rotating axes, and more specifically outlines the framework used to develop the multimedia package, highlighting our multimedia design process and philosophy.

Chapter VII

Perceptions of Laptop Initiatives: Examining Determinant Factors of University Students
for Successful Implementation / *Chuleeporn Changchit, Robert Cutshall, and Susan Elwood*..... 88

Parallel to advancements in information technology usage, there are increasing demands for basic computer skills at minimum from today's college graduates. As a consequence, many colleges and universities have chosen to stimulate campus laptop initiatives as a way to provide their students opportunities to grow their computer skills and experiences. However, the success of laptop programs is very much dependent on the degree to which students and faculty are accepting a laptop environment and are willing to implement such programs. Defining which conception factors are necessary is essential for successful implementation. This study examines such factors by focusing on university student perceptions of required laptop programs in order to distinguish which factors they perceive as important. In understanding what factors encourage student support of laptop initiatives, such programs can be made more useful to students as well as more beneficial to universities.

Chapter VIII

Incorporating Geographic Information Systems for Business in Higher Education /
David Gadish 100

Schools of business can benefit from the adoption of geographic information systems (GIS). A brief overview of GIS is presented with an example showcasing how it can be presented in a business school, the benefits for business schools, their students, and faculty, and a comprehensive approach for promoting such spatial thinking. The goal is to empower faculty to adopt GIS for their research and teaching, producing a large number of business school graduates that can promote spatial thinking in their organizations.

Chapter IX

Programming Drills with a Decision Trees Workbench /

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Decision trees are one of the most successful machine learning paradigms. This chapter presents a library of decision tree algorithms in Java that was eventually used as a programming laboratory workbench. The initial design focus was, in regards to the non-expert user, to conduct experiments with decision trees using components and visual tools that facilitate tree construction and manipulation, and in regards to the expert user, to be able to focus on algorithm design and comparison with few implementation details. The system was built over a number of years and various development contexts and has been successfully used as a workbench in a programming laboratory for junior computer science students. The underlying philosophy was to achieve a solid introduction to object-oriented concepts and practices based on a fundamental machine learning paradigm.

Chapter X

Career Questing Revisited: A Protocol for Increasing Girls' Interest in STEM Careers /

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This chapter develops an educational strategy to foster the interest and persistence of middle school girls in science, technology, engineering, and mathematics (STEM) careers using existing Websites. Criteria are specified that enable middle school teachers to evaluate Websites as supplemental learning activities within prescribed curricula. In particular, the evaluative criteria help assess sites that provide materials appealing to boys and girls, allowing teachers to adopt them without concern that they are providing an unfair advantage to girls.

Chapter XI

How to Use Vignettes in an Online Environment to Expand Higher Order Thinking

in Adults / *Maria H. Z. Kish* 135

A challenge in teaching and providing any type of instruction in the online learning environment is to ensure that participants are engaged in the process and find meaning in their learning. This case study investigated the use of vignettes as a teaching strategy and learning activity of the generative learning model in a hybrid online course. Vignettes are short and realistic stories that may help bridge participants' previous experiences to applying course material in relevant situations. The generative learning model, consisting of five main components: attention, motivation, knowledge, generation, and metacognition (Wittrock, 2000), was incorporated when requiring students to answer teacher-generated vignettes and to generate their own vignettes. Two outcomes were anticipated using vignettes within the generative learning model in a hybrid online course: (1) enhancement of academic achievement, and (2) higher order thinking. This study considered data from student work collected from the instructional techniques course, GITED 631, taught in the graduate school of education at Duquesne University, in Pittsburgh, Pennsylvania, in the fall of 2003. Eight participants responded to teacher-generated vignettes, created diagrams and rubrics, created their own vignettes, and recorded their observations concerning vignettes in reflective learning logs. The adult online learners in this study professionally focused on teaching

children and adults. This study’s participants all professionally focused on teaching children and adults. The research findings indicate that the use of teacher-generated vignettes can increase academic achievement, and that learner-generated vignettes can help students achieve higher order thinking. This chapter also discusses the methods that have been used to teach adult learners how to respond to and create vignettes for their own teaching and presentation purposes.

Chapter XII

Business-Plan Anchored E-Commerce Courses at the MBA-Level / *C. Derrick Huang*..... 157

The diversity and currency of subjects covered in e-commerce courses at the MBA-level present a challenge to educators. In this chapter, we analyze and recapitulate our experience in using the business plan to anchor the e-commerce course to address those challenges. Business plan requirements can link the various subjects together, afford students with a real-life experience learning process, and, with proper curriculum design and course delivery, give students an opportunity to be “reflective practitioners.” Results showed that students’ learning and interests for the e-commerce subjects were high with the business plan requirement.

Chapter XIII

Cyber Schools and Special Needs: Making the Connection /
Shellie Hipsky and Lindsay Adams 168

Cyber schools for K-12 students are growing in number. It is vital that appropriate strategies are devised to meet the needs of students with exceptionalities. The PA Cyber Charter School serves 468 students who have individualized education plans. Parent surveys were thematically analyzed and revealed six predominant themes including: communication, interests, focus, less-stigma from the special education label, education differences in comparison to other methods, and cyber school shortcomings. The study also utilized the action research model to determine and present the techniques and strategies that are working in the PA Cyber Charter School for their students with special needs. Teacher-tested documents included in the appendix were based on the study, and a model for special needs strategies in the cyber learning environment has been established through this chapter.

Chapter XIV

Game Mods: Customizable Learning in a K16 Setting / *Elizabeth Fanning* 180

A game mod describes a modification within an existing commercial computer-based game that has been created by a user. By game modding, a user can participate in the creative process by taking the setting of their favorite game and customizing it for entertainment purposes or to convey information. For years, commercial computer-based game developers committed considerable resources towards preventing users from “hacking” into or “hijacking” their games. Now several computer-based game developers provide editors with their products to encourage users to create content, and to allow educators, for instance, to take advantage of the benefits and production quality of commercial computer games to create customized instruction. This chapter focuses on mainstream, accessible games with straightforward modding tools that can be easily integrated into a learning environment.

Chapter XV

Project Management in Student Information Technology Projects / *Maria Delia Rojas, Tanya McGill, and Arnold Depickere* 190

Universities teach project management to information technology (IT) students. The project management principles that students have previously learned are often put into practice in a project course, intended to give final year students the experience of applying their knowledge to real or simulated projects. This chapter reports on research that investigated the use of, and usefulness of, project management in student IT projects. The results show that there was a wide range in the application of project management practices, with students being more likely to produce the initial documentation associated with some of the project management knowledge areas than to make use of it throughout the project to monitor the project's progress. The results also showed that the number of project management guidelines applied in student projects was not linked with IT project success. However, there was a strong relationship between project management plan quality and obtaining a good software product.

Chapter XVI

Teaching TCP/IP Networking Using Practical Laboratory Exercises / *Nurul I. Sarkar*..... 205

Motivating students to learn TCP/IP network fundamentals is often difficult because students find the subject rather technical when it is presented using a lecture format. To overcome this problem we have prepared some hands-on exercises (practicals) that give students a practical learning experience in TCP/IP networking. The practicals are designed around a multi-user, multi-tasking operating system and are suitable for classroom use in undergraduate TCP/IP networking courses. The effectiveness of these practicals has been evaluated both formally by students and informally in discussion within the teaching team. The implementation of the practicals was judged to be successful because of the positive student feedback and that students improved their test results. This chapter describes the practicals and their impact on student learning and comprehension, based on the author's experiences in undergraduate computer networking courses.

Section III Assessment

Chapter XVII

Assessment of ICT Status in Universities in Southern Nigeria / *Sam E. O. Aduwa-Ogiegbaen and Raymond Uwameiye*..... 216

The aim of this study is to investigate the influence of faculty affiliation and teaching experience on the use of the Internet by faculty members in six first generation universities in Southern Nigeria. A total of 476 faculty members from nine faculties across the six universities participated in the study. The data for the study was collected by means of a questionnaire survey and this was deemed appropriate as it allowed the views of all the participants to be sought on a Likert-type scale options. The results of this study provide a number of insights: (a) the faculties of engineering, science and arts in that order were the foremost users of the Internet for instructional purposes; (b) the faculties of education and agriculture

were the least experiences in the use of the Internet; and (c) faculty members with less than five years teaching experience use the Internet more than older faculty members. Recommendation was made that universities in Nigeria should invest more in ICT facilities.

Chapter XVIII

Using Indices of Student Satisfaction to Assess an MIS Program /
Earl Chrysler and Stuart Van Auken..... 232

The purpose of this chapter is to demonstrate a methodology by which management information systems (MIS) alumni evaluate the content of courses and their satisfaction with an entire MIS program. The approach can be used to assess the relevancy of an MIS curriculum. By way of clarification, an MIS program prepares its graduates to be effective in the tasks necessary to design, program and implement systems that will provide management with timely, accurate and useful information for decision making. This is in contrast to computer science (CS) programs that prepare their graduates to be knowledgeable in the technical aspects of computer hardware and operating systems software. This study first determines if there are any differences in the evaluations of the content of required MIS courses by alumni based upon whether the graduate was using their first year on the job or one's current position as a frame of reference. Next, a factor analysis is performed, using the scores earned by specific courses, to reduce the content value of specific courses into specific factors, thus simplifying understanding of the type of learning that is taking place. A factor analysis is performed both for course content scores during one's first year on the job and, again, in one's current position. Using a global measure of satisfaction with the entire MIS program, the course content factor scores are then regressed against a student's satisfaction with the entire MIS program. This regression analysis is performed, once again, for both one's first year on the job and in one's current position. The implications for evaluating the effectiveness of an MIS curriculum are presented and discussed.

Chapter XIX

How Students Learned in Creating Electronic Portfolios / *Shuyan Wang and Sandra Turner* 245

This case study investigated the learning experiences that occurred during students' development of culminating electronic portfolios for a master of education in the computer education and technology program. The meaning that students gave to their learning experiences and the problems they encountered were also investigated in order to understand how students learn in a technology-enriched learning environment. Data were collected through in-depth interviews, participant observations, and document analyses from seven M.Ed. students before, during, and after developing electronic portfolios. Findings indicate that creating electronic portfolios supports students' mastery of technology-related knowledge and promotes critical thinking and problem-solving skills. Students reported that they learned not only "by doing," but also from peers through collaboration, from reflection on their artifacts, and from synthesizing their electronic portfolios.

Chapter XX

Strategic Planning for E-Learning in the Workplace / *Zane L. Berge and Lenora Giles* 257

New information and communication technology, specifically computer networked systems, create both a demand and an opportunity for businesses to approach training and knowledge management from new perspectives. These new training perspectives are driven by the need for businesses to provide the right training quickly and efficiently and to support knowledge systems that are current, accessible, and interactive. This chapter will discuss strategic planning in terms of the organizational elements and the e-learning program requirements that are necessary to build a framework in order to institutionalize and sustain e-learning as a core business process.

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