Preface

TECHNOLOGY: THE LONG ROAD

If technology is the question, what is the answer? And conversely, if technology is the answer, what is the question? Since the onset of the industrial revolution, the societal conceptualization of technology has changed from a view of technology as a tool or technique to a view of technology as a system. Pre-industrial revolution technology was represented by new tools and techniques (E.g., agricultural tools, spears, gunpowder, steam engine, etc) which could be used to manipulate the environment in specific ways. This conceptualization gave way to the view of technology as a system during the industrialization of society when new techniques were developed for restructuring organizations around systematic operations and mechanisms of production within which humans operated. This shift marked the birth of modern technological systems and the rise of new types of social complexities that emerged as traditional ways of life and society began to be threatened. Technology was no longer a set of visible tools and objects to manipulate; it was now a complex system that separated human work and activity from human values and ways of life that defined individuals and society. This view of modern technological systems was equated with concerns about human freedom and fear of a new form of slavery. Ellul (1966) described technological systems as powerful innovations that came with a heavy price that created a dilemma for its users:

"The individual is in a dilemma: either he decides to safeguard his freedom of choice, chooses to use traditional, personal, moral, or empirical means, thereby entering into competition with a power against which there is no efficacious defence and before which he must suffer defeat; or he decides to accept technical necessity, in which case he will be the victor, but only by submitting irreparably to technical slavery" (p.84)

The second major shift in the conceptualization of technology was a shift inside, which arose with the onset of the information age. Over the last forty years, the conceptualization of technological systems has gradually changed from a technological system outside of human culture and values to one that is now part of everyday life and meaning. This is partly due to the proliferation of technological innovation and scientific advances. It is also due to the ongoing institutionalization of technology into education and the public sphere. Under this view, technological systems are interwoven within our lives and social institutions as intermediating forces that help shape experience, interaction, communications, and knowledge innovation. It is this conceptualization of technology that comes closest to capturing the complexity and breadth of issues that challenge us today. This is particularly salient in higher education where the preoccupation with technology to advance knowledge innovation is a priority. To this end, Cases on Digital Technologies in Higher Education: Issues and Challenges focuses on the institutionalization of technology into education. More specifically, it focuses on the integration of technology (and new techniques) into various areas of higher education.

HIGHER EDUCATION: FROM THEN TO NOW

Perhaps better than any academic in the 20th century, Whitehead was deeply interested in the area of the connection between educational development and the rhythm of growth. Whitehead (1929) viewed education as an organic growth process where the student and subject matter evolved together. He believed the aim of education could be divided into three fundamental stages: (1) the stage of romance, (2) the stage of precision, and (3) the stage of generalization. In the first stage, educational experiences arise through emotional engagement of young learners as they engage with diverse subject matter in a way that inspires and fulfills a need for stimulation and enjoyment. In the second stage, learning takes on a new direction by focusing more on specific areas of mastery as found in the sciences and technical subjects, including logic and spoken languages. The final phase, generalization, attempts to integrate elements of romance and precision into a general framework of useful knowledge that can be deployed in real contexts. Unfortunately, the lack of romance within the educational system has turned many students off of learning and reduced the potency of Higher Education. As argued by Whitehead (1929), "The justification for a university is that it preserves the connection between knowledge and the zest of life, by uniting the young and the old in the imaginative consideration of learning" (Whitehead 1929, p. 93). Whitehead has contributed a formidable challenge for universities that academics are still striving for today.

What new technologies bring into education (on a good day) is a means to rekindle some of the lost romance with learning that Whitehead was so concerned about. New technologies offer greater flexibility in teaching and learning by providing more opportunities for instructors to adapt teaching to student interests and different learning styles. The question is, how these new learning opportunities can be realized. If, as Whitehead (1938) believes, "The task of a University is the creation of the future" (p. 233), then there is an onus on developers and instructors to make sure that the future is a bright one and that technology is complimentary to university teaching rather than being contradictory.

DIGITAL TECHNOLOGY IN CONTEMPOARY HIGHER EDUCATION

As a key centre of adult education, social meaning creation, and socio-political debate, institutions of higher education are at the forefront of our technological interface with life and society. Technological innovation within university research centres, university library resource developments, and new tools available for teaching and learning are nurturing in new educational approaches and debates concerning the appropriate use of new technologies. As is demonstrated in this volume, absolute support for or opposition against technology in society has given way to more nuanced relationships. This follows a view of technology as a complex systems intertwined in a web of human interests and needs that require study in order to draw out challenges encountered and lessons learned about new technologies applied to various contexts of higher education.

In terms of objective, this co-edited volume attempts to provide a collection of practical case studies (and essays) exploring the application of digital technologies in higher education along with strategies to address new challenges facing educational institutions in the 21st century. It does so by juxtaposing a selected set of perspectives from educators, researchers, designers, and developers working in key areas of higher education. Taken together, the set of chapters within this edited volume help to illustrate through practical case studies and essays how digital technology is playing an important role in higher education. This book will be of interest to those affected by digital teaching and learning within institutions of higher education along with university administrators and researchers working in this area.

ORGANIZATION

In terms of organization, Cases on Digital Technologies in Higher Education: Issues and Challenges is divided into 17 chapters focusing on particular themes of interest revolving around digital technologies in higher education. They are as follows:

Chapter 1, entitled, "ELATE: Evolving an E-Learning Faculty Wiki", is a case study focusing on the creation of an e-learning wiki to support faculty in their work at Kansas State University. This chapter reviews key research literature and pedagogical theories on wikis. It also addresses practical challenges connected to the planning and building of a wiki site by dealing with important considerations such as, intellectual property policies, accessibility issues, content development issues, and publicity issues linked to the launch of the ELATE wiki to the Wikisphere.

Chapter 2, entitled, "Open Source and Bridging the Digital Divide" is a case study focusing on contemporary conceptualizations of open source and the digital divide with a focus on key considerations including operating systems, software, inexpensive hardware, and technological access issues. The chapter ends with a discussion of practical implications of open source in higher education and future directions. It provides a timely discussion of key concerns faced by institutions of higher education around the world.

Chapter 3, entitled, "A Conversation Approach to Electronic Collections Development Within University Libraries", explores student perspectives on electronic collections development within university libraries. This case uses a conversational modeling framework derived from student focus group discussion data to uncover student perspectives and factors affecting students' stances towards current and future electronic collections development trends. It also identifies a number of conversation modeling strategies used by students in fostering perspective sharing to inform consensual decision-making in contexts where communication gaps surrounding technology and its use in society exist.

Chapter 4, entitled, "Education Technology in Teacher Education: Overcoming Challenges, Realising Opportunities", explores the use of educational technologies within a pre-service teacher education program in New Zealand. This case discusses challenges and opportunities faced within teacher training for pre- and in-service teachers. To this end, it investigates the integration of educational technology to leverage a trans-disciplinary learning activity. This case highlights key teacher training challenges revolving around task complexity and possible resistance to change in higher education.

Chapter 5, entitled, "Wikis as open educational resources in higher education: Overcoming challenges, realizing potential", provides a case study on open wiki use within a single online postgraduate course at Massey University in New Zealand. Specifically, the case focuses on the use of open wiki technology at WikiEducator as a teaching presentation tool and as a production tool used by learners within the context of an instructional design project. This chapter discusses practical challenges and opportunities associated with wiki use in contemporary higher education.

Chapter 6, entitled, "Doctoral Faculty 2020: Preparing For the Future in Educational and Organizational Leadership", offers an insightful case study on faculty competencies within an organizational leadership doctoral program. The case identifies key skills necessary for doctoral faculty in leadership programs based on a review of relevant literature and interviews with faculty. This case study takes a serious look at the new competencies needed by doctoral faculty to meet the instructional needs within current and future context of doctoral level instruction.

Chapter 7, entitled, "Technoethical Study of Electronic Technology Ab/Use at University", explores how university students view non-work related use of electronic technology within universities (I.e., electronic monitoring technology and personal use of electronic technologies). This chapter highlights

student experiences and ethical stances concerning non-work related use of electronic technologies within universities as well as the variables that affect their decision to engage in or not engage in personal electronic technology use during class. Drawing on research literature and conversational data derived from online group work, this study sheds light on attitudes and factors affecting students' ethical stances towards non-work related technology use at university.

Chapter 8, entitled, "Faculty Training and Mentoring at a Distance: Learning Together in the Virtual Community", provides an insightful review of selected work on instructor practices and faculty training in the context of online course design and delivery. This chapter reviews two selected cases (Delgado Community College and Excelsior Community) to identify key online faculty training challenges in different contexts. This chapter illustrates the importance of understanding organizational changes associated with current efforts to improve faculty development for online teaching in higher education.

Chapter 9, entitled, "The Potential for Student Engagement Using Clickers in a Large Introductory Class", reports on findings from an innovative pilot project focused on the integration of a personal response system (clicker technology) into an undergraduate classroom. Personal response systems were integrated into a large introductory class in Communications with the aim of leveraging student engagement and learning opportunities during lectures. This chapter discusses key challenges associated with student engagement along with suggested exercises to take advantage of this technology in the classroom.

Chapter 10, entitled, "'The Knee Bone Connected to the Thigh Bone': A Case Study of Teaching Anatomy Engineering Students Using State-of-The-Art Anatomical Software", presents a study on teaching Bioengineering at Newcastle University using a variety of selected tools (I.e., Primal Pictures, anatomical software, teaching material, peer to peer learning). The case explores how Bioengineering students used technology to construct an understanding of anatomical principles. Based on written feedback from students , this chapter provides evidence that the integration of new technologies promotes positive learning experiences and a deep knowledge of anatomical descriptions among students.

Chapter 11, entitled, "Improvement of Engineering Students Education by E-learning", provides an insightful look at the growth of e-Learning in engineering education. The chapter explores various ways to develop e-Learning in engineering education with an emphasis on the international design of e-Learning, within selected developing countries. The authors show how new advances in technology allow the realization of a more distributed structure of knowledge transfer that can benefit developing countries that lack core resources and infrastructure.

Chapter 12, entitled, "Purpose-Oriented Small Software: A Case Study for Some Engineering Subjects" provides a novel approach to engineering education. It presents an alternative approach that places instructional focus on sophisticated uses of general purpose software rather than focusing on specific computer applications. To this end, it discusses educational advantages of purpose-oriented small software which can be designed as a cost-effective way to leverage undergraduate student learning in engineering.

Chapter 13, entitled, "Managing Learning Activities in E-Learning Systems", delves into learning activity management systems as new tools to facilitate the design and management of online collaborative learning. The chapter highlights how new learning design tools allow instructors to better organize and monitor learning activities within e-learning systems. The chapter also addresses challenges and possible solutions to improve the management of e-learning systems.

Chapter 14, entitled, "Architectural Web Portal and Interactive CAD Learning in Hungary", presents the teaching web portal of the Faculty of Architecture at Szechenyi Istvan University and demonstrates how it can be used to leverage learning. This chapter explores how this teaching web portal can accommodate a diversity and complexity of architecture, while being attentive to professional standards. This chapter proposes that this system can help students to become more self-directed learners.

Chapter 15, entitled, "WIRE: A Highly Interactive Blended Learning for Engineering Education", takes a sobering look at blended learning and the challenge of integrating it into a coherent learning model that effectively sustains interaction between teacher and students. This study offers innovative strategies for combining online and face-to-face learning environments into a semester course. Findings are presented and key points are discussed.

Chapter 16, entitled, "Competitive Design of Web-Based Courses in Engineering Education", addresses the ongoing challenge of trying to design web-based courses to augment university learning. This chapter contributes an innovative approach applied to the design of web-based engineering courses. To this end, the chapter identifies key areas of focus needed to optimize the design of web-based engineering courses subject to a variety of constraints. It also highlights the need for customized approaches to web-based course design.

Chapter 17, entitled, "Web-Based Approaches in Engineering Education", takes a step back from the web-based course design in engineering education in order to conceptualize its most important elements to address within the context of e-learning. This provides practical insight into the requirements of engineering education for the 21st century by focusing on factors including, facility constraints, inadequacies of e-learning, and training techniques within engineering instruction.

Additional material has been added to further augment the breadth and depth of coverage within this case book. These selected readings help further the coverage on digital technologies in higher education. They are as follows:

Chapter 18, entitled, "A Needs Analysis Framework for the Design of Digital Repositories in Higher Education", addresses the various motivations and needs connected to virtual repository development in college and university settings. It posits a needs analysis framework to guide the design of digital repositories in Higher Education. To this end, it describes a needs analysis framework applied to the Australian higher education sector, the Carrick Exchange.

Chapter 19, entitled, "ICT Integration Efforts in Higher Education in Developing Economies: The Case of Addis Ababa University, Ethiopia", applies a modified version of Tearle's model (2004) to examine the integration of ICTs within the educational setting of developing economies with limited resources. To this end, the chapter assesses the challenges faced by teachers and management at Addis Ababa University in Ethiopia.

Chapter 20, entitled, "Game Informed Virtual Patients Catalysts for Online Learning Communities and Professional Development of Medical Teachers", focuses on the complexities of medical education and issues relating to practice, professional development, and learning. This chapter describes how virtual patient resources are used to create new learning tools and resources has contributed to aid professional development of those engaged in teaching medical students at the University of Edinburgh.

Because the issues related to digital technology in higher education are so broad, this edited volume is necessarily selective. It attempts to advance in its own modest way a selective synthesis of key contemporary work on technology to help guide individuals within institutions of higher education faced with technological change. This edited volume makes a concerted effort to place a strong emphasis in the area of engineering education. Because engineers are the key proponents and creators of technology, there is a special need in engineering education to address technological concerns and find solutions that will help maximize the utility of new digital technologies and minimize their adverse effects. By juxtaposing case work from engineering education with other academic areas in Higher Education, new opportunities for scholarly exchange may be realized. Despite the modest aims of this project, this co-editor realizes that it is not possible to please everyone. It is hoped that this volume of practical case

studies and essays will be helpful to individuals in all areas within institutions of Higher Education. Critical comments and suggestions are welcome.

Sincerely,

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REFERENCES

Whitehead, A. (1929). The Aims of Education and Other Essays. New York: Macmillan.

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