Chapter 1
Conceptualizing ICT

ABSTRACT

It is necessary to conceptualize technology in general before it is possible to conceptualize information and communication technology (ICT) in particular. Like so many ideas in the Western world, the conceptualization of technology begins with Plato and Aristotle in ancient Athens, and ever since that time, philosophers have struggled with the idea that technē – translated best as "making" – involves a mysterious co-operation between imagination and reason, or, in modern terms, art and science. Technology, like storytelling, is a fundamental human activity, and technology operates at the core of all design, whether it be architecture, engineering design, or industrial design. Andrew Feenberg has established what is perhaps the dominant conceptualization of technology at the present time with his argument that technology is neither a handy tool for human mastery of the environment, nor an out-of-control external force that will ultimately destroy humanity, but a cultural phenomenon that we can employ democratically to improve our future existence. Aristotle argues that there is an essence or formal cause in anything that is made, and that this essence determines its end or final cause. Feenberg, however, argues that people determine the end of any technology by the way that they choose to use it. This difference – teleology versus democratic utilitarianism – is a theme that recurs throughout the book. This chapter ends by identifying ICT as the latest, computerized, globalized manifestation of technology's recurring dream and promise of transforming the world that we are given into the world that we desire.

INTRODUCTION

ICT – information and communication technology – is a vital cultural concept that has developed in recent years along with the relatively sudden, and generally unforeseen, burgeoning of computerization as a systematic method of organizing virtually all features of society at the end of the twentieth century and the beginning of the twenty-first century. The importance of ICT is undeniable. This new concept has already transformed the ways that people around the world interact socially, economically, and even politically. The central symbols of ICT are the Internet, the World Wide Web, and the mobile telephone – ultra-modern technologies that have recently become naturalized, or taken

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for granted, in people's daily lives, although they were practically unknown just twenty years ago.

From the outset ICT was hailed by educators at all levels for its immense and immeasurable promise of transforming the practice of education as a whole. Both the teaching experience and the learning experience would be improved by computers, simply because of their presence in the classroom and the laboratory. Students would become smarter – or at least perform better cognitively – and teachers would not have to work so hard to make this happen. In addition, ICT would make education not only more enjoyable for students but also more socially inclusive and interactive. If the purpose of education is to improve the lives of both individuals and social groups, then ICT would make those goals possible to attain – almost immediately.

When such fulfillment was slow in coming – or even unforthcoming – educational administrators were not only disappointed but also baffled. It seems that the institutional implementation of ICT was not enough in itself to transform education. Ironically, this has been especially true of higher education. In a recent study of the difficulties universities have experienced in trying to successfully implement ICTs Bjørn Stensaker *et al*. (2007) say, "It is not the visions, the visionaries (the institutional top-management), and the economic foundations that seem to be lacking, but an effective link between purpose, people, and pedagogy inside the institutions" (p. 431). Indeed, the metaphor of the "missing link" – somewhat like the popular cognitive metaphor of the "black box" – is often used to describe the problematic practicality of using ICT in higher education in a way that will come even close to realizing its theoretical potential for transforming the interrelated experiences of learning and teaching.

There is no doubt that enthusiasts and champions of ICT have often oversimplified and overgeneralized its practical application in higher education. Nevertheless, notwithstanding such a warning about pragmatics, any comprehensive analysis of the use of ICT for educational purposes must begin with theoretical considerations. Fundamental questions about both the nature and the purposes of ICT need to be asked and answered, however tentatively, before we can meaningfully discuss the mysterious problems and processes of actually implementing ICT for educational purposes. Without a theoretical starting point to guide us, it would be virtually impossible to find a proper direction to take to search for the optimal missing links of ICT practice in higher education.

In itself daunting, an investigation of the theoretical articulation of ICT is further complicated by the fact that in order to understand computer technology we first need to understand technology in general, and once that is done – if indeed it can be done in a manner that is reasonably satisfactory – we will still need to pursue an understanding of communication. But first things first. We must begin our attempt to investigate and decide how ICTs can enhance the design education of architectural and engineering students by considering, in some detail, the historically complex and contradictory conceptualization of technology itself as a basically human and social reality, one that possesses the same cultural magnitude as economics, politics, and art in all its wide variety of forms.

CONCEPTUALIZING TECHNOLOGY

Historical Considerations

First, Pre-Historic Matters

The common understanding of technology is that it is the use of tools for solving problems. The old adage, "Necessity is the mother of invention," expresses this belief very well. It is also commonly supposed that technology follows scientific discovery. In fact, technology is often conceptualized as "applied science." These two common beliefs, taken together, place technology in a derivative or secondary position. The popular scenario might