Chapter 11
IT Students as Design Leaders

Geraldine Torrisi-Steele
Griffith University, Australia

ABSTRACT

Graduates of computer science and related degrees represent the capability to continue the evolution of technologies and drive the future in emerging technologies. Some of these graduates will be technological leaders, innovating and pushing the boundaries of technological possibilities throughout their careers. Even though it is a popular opinion that 'the technical' and 'design' do not mix, the author's proposition is that graduates with technological degrees must also be 'design leaders. Design is imperative to meet the needs and desires of users; the design provides some solution to a problem in a user or human-centered manner. Equipping technological students with capabilities for both technological leadership and design leadership will help ensure a human-centered vision for our technological future.

INTRODUCTION

Undeniably, digital technologies are on the center stage of human society. For millions of people around the world, technology is present in daily existence. Digital technologies are everywhere, being used in a multitude of contexts from business to medicine, education, and industry. Artificial intelligence, machine learning, robotics, the internet of things – the future of technology is exciting and there are promises that technologies will reshape human activity. Not surprisingly then, many students envisage success and exciting technology careers. Hence, information technology and computer science degrees are popular choices for many students entering university. These degrees usually deliver the required technical knowledge in key areas such as programming, software development, databases, networks, security, etc. With a focus on technical knowledge, mention of 'design' is scarce. At best, the term design in the technical domains is associated with areas such as human-computer interaction, user interface design, and user experience. Within the author's experiences of teaching computers in technical degrees, the perception is that 'design' is almost in the 'opposite corner' to the technical world. The concept of design for most technical students is associated with aesthetics and for many of the technical student's world view is that design is not relevant to them. The authors' proposition is that design is highly relevant to degree

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programs in information technology and science. In the present chapter, the author explores the idea of design and crafts an argument that, in the context of emerging technologies, graduates with information technology and computer science degrees must also be technology leaders but also design leaders.

DESIGN AND ANTICIPATORY DESIGN

While the topic of leadership in the business world has received a great deal of attention over the years and resulted in substantial literature, design leadership is only recently emerging as a dimension of leadership. Unfortunately, the concept of "design leadership" is muddied by the common use of the word 'design'. For many, the term design simply refers to the aesthetic appearance of something and conjures images of artworks and galleries. For others, the concept of design is more mature - "design is seen as the manipulation of visual or tangible aspects of physical matter or information at the point of output" (Celi & Rudkin, 2015, p. 61). At the core of the design is the imperative to meet the needs and desires of users; the design provides some solution to a problem in a user-centered way such that users can effectively and efficiently meet their goals.

Design meets technology in the field of Human-Computer Interaction (HCI)and its derivative fields. The advent and subsequent ubiquitousness of the personal computer and the accompanying graphical user interfaces provoked the emergence of the field of digital design. From a historical perspective, the field of digital design can be seen to have evolved from the field of HCI as well as the more traditional pen-and-paper field of graphic design.

The beginnings of HCI may be traced back to the National Bureau of Standards conference called Human Factors in Computing Systems which took place in 1982 (Carroll, 2001). This conference, together with the foundation laid by earlier work in cognitive science in the 1960s and 1970s (which related to areas such as software engineering, prototyping, and user interfaces) inspired the subsequent growth and popularization of the field of HCI (Carroll, 2001). HCI is concerned with usability (i.e. the ease with which humans are able to interact with a system in order to achieve their objectives) and has subsequently spawned the fields such as user interface design (UID), user interaction design (UxD), human-centered design, and most recently User experience design (UX).

Reconsider now the definition of design given earlier as "manipulation" of "aspects of physical matter or information at the point of output" (Celi & Rudkin, 2015, p. 61). Implicit in such a conceptualization of design is the notion that design is about problem-solving in relation to some already identified problem. Hence, it may be considered that the designer's task occurs only at the endpoint of a process. Indeed, a dominating perception of design has been that designers are responsible for delivering products appealing to consumers, including packaging, graphics, and logos (Han & Bromilow, 2010). In literature, though, we find that some authors encourage a redefinition of the design discipline in a way that highlights the capacity of design to be future-facing rather than simply being the solution or endpoint to a pre-determined problem. Futurists such as Zamenopoulos and Alexiou (2007) propose what they call an anticipatory view of design. From the anticipatory perspective, the discipline of design must go beyond merely generating a design solution for an apparent problem to communicating a vision of the future. No longer designed simply about output and an end-point, it is also about envisioning the future and being a catalyst for change and innovation (Celi & Rudkin, 2015).

Now more than ever, the anticipatory view of design is important. To understand why this is so, consider the present digital age. It is a time when technologies are infiltrating almost every aspect of