Interdisciplinarity in Telecommunications and Networking

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ABSTRACT

The interdisciplinary approach can be beneficial to researchers, educators, and practitioners for solving complex problems and synthesizing knowledge. While a great deal has been written about interdisciplinary activity in relation to the humanities and the natural and social sciences, it has been important in the telecommunications and networking field as well. This article investigates the subject of interdisciplinarity, especially as it relates to telecommunications and networking research and education. Among the questions examined are: What exactly is meant by "interdisciplinary"? Why is the interdisciplinary approach important in telecommunications and networking research and education and what are some examples of how is it being utilized? How does the International Journal of Interdisciplinary Telecommunications & Networking differ from other telecommunications and networking publications in its treatment of interdisciplinary research and what does the journal hope to accomplish?

Keywords: Interdisciplinary Education; Interdisciplinary Research; Interdisciplinary Telecommunications; Networking; Telecommunications

INTRODUCTION

Driven by the need to solve complex social, economic, and technological problems, the desire to explore broad issues requiring more than one discipline, and the need to integrate the knowledge generated from these efforts, the late twentieth century witnessed a dramatic increase in interdisciplinary activity among researchers, educators, and practitioners that continues to this day. In its report *Facilitating Interdisciplinary Research* (2005), which reviews the state of interdisciplinary research and education in science and engineering and recommends ways to facilitate them*,* the Committee on Science, Engineering, and Public Policy of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine asserted:

Interdisciplinary research (IDR) can be one of the most productive and inspiring of human pursuits—one that provides a format for conversations and connections that lead to new knowledge. As a mode of discovery and educa-

tion, it has delivered much already and promises more—a sustainable environment, healthier and more prosperous lives, new discoveries and technologies to inspire young minds, and a deeper understanding of our place in space and time. (p. 1)

Among the great triumphs of interdisciplinary inquiry and collaboration cited in the National Academies' report are the discovery of the structure of DNA, the Manhattan Project, laser eye surgery, and manned space flight. Current "hot" interdisciplinary research topics cited by the Committee include nanotechnology, bioinformatics, neuroscience, conflict, and terrorism. Other examples of vital interdisciplinary research and educational activity mentioned in the report include: the strong attraction of students to interdisciplinary courses; the growth in the number of university departments resulting from a blending of previously distinct fields; the growth in the number of interdisciplinary centers, institutes, and similar units at universities; the excellence of interdisciplinary research and development at industrial laboratories such as IBM's Research Center in Yorktown Heights, New York, Alcatel-Lucent's Bell Laboratories in Murray Hill, New Jersey, and Xerox's Palo Alto Research Center in California; strong interdisciplinary research programs at national laboratories such as the Oak Ridge National Laboratory in Tennessee, Lawrence Livermore National Laboratory in California, the Jet Propulsion Laboratory in California, and the National Institute for Advanced Interdisciplinary Research in Japan; funding for interdisciplinary research projects by the National Science Foundation, National Institute of Health, and the Defense Advanced Projects Research Agency; and the proliferation of government-industry-university collaborations in fields such as the life sciences.

The literature on the subject of interdisciplinarity is extensive (see Klein 1990; Klein 2006). A search of Ulrichsweb.com (2008) for periodicals whose title keyword contained the word "interdisciplinary" yielded 307 results, primarily periodicals pertaining to the humanities and the natural and social sciences. Key issues that researchers into the subject of interdisciplinarity have investigated include: the meaning of the term interdisciplinary; how interdisciplinary efforts relate to disciplinary efforts; the benefits of interdisciplinary thinking; under what conditions interdisciplinary projects should be undertaken; how interdisciplinary activities should be performed and managed; and applications of interdisciplinarity in research and education.

The remainder of this article will focus primarily on interdisciplinary activities in research and education in telecommunications and networking. The article is structured as follows: the next section examines what is meant by the interdisciplinary approach and investigates some characteristics of it; the following section describes why interdisciplinarity in telecommunications and networking research and education is important and provides some examples of interdisciplinary activity in the field; and the last section describes how telecommunications and networking journals have been treating interdisciplinary research and how the *International Journal of Interdisciplinary Telecommunications and Networking* will differ from them. The article concludes with a summary and a statement of the journal's vision.

THE INTERDISCIPLINARY APPROACH

Although the term "interdisciplinary" is frequently used, there is sometimes confusion over what exactly is meant by it. Webster's Third New International Dictionary (1971) defines "interdisciplinary" as: "characterized by participation or cooperation of two or more disciplines or fields of study: drawing on or contributing to two or more disciplines." The term "discipline" is defined as "a subject that is taught: a branch of learning: field of study". Klein (1991) is more precise in her definition of a discipline: a discipline "signifies the tools, methods, procedures, exempla, concepts and

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