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A Technology Systems Course: An Essential Component of General Education Curriculum

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Introduction

A central mission for educational institutions is to prepare students for a successful transition from the world of school to the workplace. To accomplish this, universities must offer a curriculum that provides students with a basic understanding of the technological society in which they live. The study of technology, as an integral part of general education curriculum at the university level, is a logical response to the society's need for individuals who are able to effectively participate in a technological world. This manuscript will provide an overview of the course, *Technology Systems*, that was integrated into the general education curriculum and offered in the Fall 1997 to all freshman students at Morehead State University. A preliminary assessment of students' enrollment indicates that *technology systems* will not only introduce the relatively new discipline of industrial technology to university

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students but also will increase students' enrollment in industrial technology programs.

Rationale

According to Dugger and Satchwell (1996), "Technology is human innovation in action. This involves the generation of knowledge and processes to develop systems that solve problems and extend human capabilities" (p. 14). The study of technology could be defined as the knowledge and understanding of human endeavors in creating and using resources, processes, and systems to manage the environment for the purpose of improving living conditions. The increasingly powerful role of technology in society and the related global concern to establish technology as a component of general education has led to an emphasis on the promotion of technological literacy (Jenkins, 1997, p. 2). Streichler (1996) argued that, "In today's educational and work environment and that of the future, the individual will need to be both technically adept and technologically literate" (p. 3). For this, present and future citizens should be equipped with certain technological knowledge, technical skills, a desire for life-long learning, and values which enable them to cope with an unpredictable and complex society.

College graduates may not be able to effectively participate in our technology-based society unless they are provided with an opportunity to develop technological knowledge. Scholars suggest that the main objective of liberal education is to help emancipate individuals from ignorance, prejudice, and narrowness by providing

information, awareness, and understanding of various life issues. If the purpose of liberal education is to help individuals develop an orderly mind for a productive life, technological literacy must be provided as an integral part of that education.

Bensen (1995) argued that, "We are in a highly advanced technological society, and having a world view and an understanding of the practice elements of this culture is central to being competent people" (p. 19). Technological literacy is considered by some scholars to be critical to the success of individuals, entire societies, and to the earth's ecological balance. Therefore, the study of technology should be a required subject for every student at every level (Dugger and Satchwell, 1996). This vision necessitates major curriculum revisions, program development, and teacher enhancement to insure that all college students are provided with an opportunity to become technologically literate. To accomplish this, the study of technology during elementary school, middle school, high school, and beyond should become a national priority (Dugger and Satchwell, 1996, p. 14).

When college graduates enter the workforce, they must be able to develop intellectual skills required for making critical and informed decisions regarding technological issues they encounter. In order for university graduates to become technologically literate, capable of using and managing technology, they must have a reasonable understanding of what makes technology work. Such an understanding encompasses both physical and social aspects of technology such as

systems and processes, productivity and quality, construction, manufacturing, transportation, and the impacts of technology on the environment.

A general education *technology* course is necessary to address the discipline of technology and its relationship to other disciplines, individuals, and society. The study of technology will enable students to gain experience working with a wide variety of technological devices and processes (Dugger and Satchwell, 1996). A *technology* course should place an increased emphasis on the study of industry and technology, critical consumerism, and the development of intellectual processes and interpersonal behavioral skills (White, 1990). The study of technology crosses many traditional disciplines and integrates knowledge from mathematics, physics, history, literature, and other disciplines into a much broader interdisciplinary perspective (Broudy, 1960; Edminson, 1992a; Johnson, 1992; and Zuga, 1988).

The study of technology should focus on the development of all domains of learning, including critical thinking and problem-solving skills. These skills should be fostered through both group and individual learning activities within a curriculum based on *communication, construction, manufacturing, and transportation*.

The primary objectives of a liberal education curriculum are to empower individuals to live productive lives, to provide a coherent and comprehensive understanding of human knowledge and culture, and to develop an orderly mind (Boyer, 1987). To achieve these objectives, the study of technology fits at the core of liberal education (Peterson, 1992; Waetjen, 1987). This statement implies that in order to meet the need for technologically literate citizens in our society, higher education institutions must include the study of technology as a component of the liberal education curriculum. To these ends, the course *Technology Systems* was developed and integrated in the general education curriculum at Morehead State University.

Course Content

Course Description

The course, *Technology Systems*, is a three credit hour, freshman-level offering with pre-college curriculum prerequisites. The course is described as a study of technology systems and processes in order to develop an understanding of the impact of technology on individuals, the environment, and the global community. The course is integrated in the *practical living* category of the general education framework where the development of life skills is a primary emphasis. It could also be offered as an area studies course within the context of natural and mathematical sciences.

Purpose, Goals, Anticipated Outcomes, Activities

The purpose of the course is to facilitate the integration of knowledge from mathematics, physics, history, literature, and other disciplines into the broader interdisciplinary perspective of a technological society. The course is designed to introduce students to technology systems and processes in order to develop an understanding of the impact of technology on individuals, the environment, and the global community.

The general education goals which will be fulfilled by the course are categorized as *essential* and *important*. The essential goals are: 1) to function responsibly in the natural, social, and technological environment; 2) to locate, select, organize, and present information efficiently; and, 3) to think and reason analytically. The important goals are: 1) to communicate accurately and effectively; 2) to make informed and ethical value decisions; and, 3) to develop life skills.

The goals of this course will be accomplished by the development and assessment of learner outcomes. These outcomes are: 1) students will be able to solve technological problems, use technological tools, resources, and processes to design, build, analyze real-life projects; and 2) students will be able to demonstrate their understanding of technology systems in both written and oral format; 3) students will be able to locate, collect, organize, and

present information from various disciplines in written and/or oral format; 4) students will be able to use electronic media to communicate information; 5) students will demonstrate an ability to analyze technological issues and make informed decisions; 6) students will demonstrate an ability to solve problems individually and/or in groups; 7) students will be able to apply principles of mathematics, physics, and other disciplines to solve real-life problems; and, 8) students will develop an understanding of how technology is used to promote human potential.

In order to achieve the intended goals, relevant and appropriate learning situations are utilized, such as individual and group activities, hands-on projects, periodical and text critiques, and research assignments. The activities include simple research and writing assignments, critical viewing of video tapes, and using the Internet and campus e-mail. The group activities allow students to work together in order to solve technical problems. Research reports must reflect ideas that are not mere repetitions of what is already stated in the readings, but rather reflections on what was read.

Course Outline

The course is comprised of a series of instructional units, listed below, and is offered during a 16-week semester with the units having a two to four week duration.

Unit 1 - Elements of Technology Systems: Nature and definition of technology, technology and human knowledge, the application and control of technology.

Unit 2 - Technology Systems Approach: critical thinking, problem solving methods, reasoning, analysis/synthesis.

Unit 3 - Communication Technology: telecommunications, graphics, networks.

Unit 4 - Manufacturing Technology: Quality control, product development, planning, automation.

Unit 5 - Transportation Technology: Energy and alternative power sources, systems, and intermodal transportation.

Unit 6 - Construction Technology: our constructed world, planning, managing projects, future building and structures.

Instructional Strategies and Environment

The primary theme of the course is based on elements from the applied sciences. The pedagogy provides an environment to reinforce students' basic skills and enable them to develop higher level thinking skills such as problem-solving and critical thinking. To achieve these objectives, the following teaching strategies will be used: 1) lecture/discussion/demonstration, 2) group/individual projects, 3) reading library materials, 4) technical projects, 5) written reports/oral presentations, 6) viewing video tapes, 7) multimedia presentation, and 8) team teaching.

Conclusions

Technology shapes the way we live. Technology is an integral part of our culture. As college students graduate and enter the workforce, they must be capable of integrating their knowledge and experience with the technological tools and techniques they manipulate. Therefore, all university students need to become aware of technology systems and how they impact individuals and the global community. A better understanding of

technology systems and processes can be developed by the design, analysis, and application of technological tools. For individuals to become technologically literate and capable of making quality life decisions, an understanding of technology systems and processes is necessary. This course will provide an understanding of the role of technology in solving global community problems and provide students with necessary knowledge to make informed decisions in today's technology-driven global society.

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