INTEGRATION APPLICATION IN INTERDISCIPLINARY TEACHING: CASE OF SCIENCE AND TECHNOLOGY AREAS

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ABSTRACT

Interdisciplinary teaching usually starts with question or subject and it continues as answering complicated questions.

The basic objective in interdisciplinary teaching is not to transfer knowledge of a specific disciplin but more to use knowledge of various disciplines for a specific aim. Interdisciplinary programs are composed of colloboration activities which are performed between two or more teachers/instructors.
Rapid development of information and communication technologies increases the need of using technology in learning-teaching process. Using technology in learning medium provides enhance learning skills for students, attracts students' interests , focuses on student and helps to increase their motivation.
In this study, it is aimed to examine interdisciplinary approach with details and to present applications of science and technology integration. It can be also counted a literature research.

Keywords: interdisciplinary teaching, science, technology, integration.

INTRODUCTION

The concept of interdiciplinary is used for various areas besides it generally means the colloboration of more than one discpline or sub disciplines. The concept of interdisciplinary describes a research method which is seperation free and allows describing and solving problems independent from areas by getting rid of limitations of disciplines of a high percentage. If it is considered that disciplinary teaching is a teaching which is performed in the frame of a specific subject area (such as mathematics or history), interdisciplinary teaching can be described as presenting traditional subject areas by gathering them meaningfully around specific concepts (Yıldırım, 1996).

Dezure (2000) used interdisciplinary concept to examine the differences of problem oriented discipline approach of teachers and students and also used as a knowledge forming process to compose a synthesis.

Interdisciplinary approach based teaching is always based on deep themes (principles, theories, generalizations, concepts) which lie beneath a central subject (theme approach). Students examine the subject by using the disciplines which help their researches (Martinello, 2000).
One of the most important purposes of interdisciplinary teaching is to make students gain a versatile thinking way. Problems to transfer knowledge that gained at school to the daily life, lack of refreshing knowledge and lack of developing learning and research habits are some of the educational problems that we confront.

It is stared that science and technology education plays a key role for the future of societies at this present information and technology era where scientific information grows exponentially, technologic innovations develop rapidly, effects of science and technology are seen clearly every area of our life. Because of this importance, especially developed countries and all others keep working on increasing the quality of science and technology education.

Technology supports an active frame where students not only solve problems but also find their own science problems to explore. Technology has the capacity which generates new opportunities for authentic education by bringing real life problems in order to encourage students for making scientific researches; at the same time it provides tools for increasing learning level, offers more facilities for feedback, reflecting and revising of students and teachers/instructors; creates local and global communities and expands the possibilities for instructor's learning (Kate, 2003).

INTERDISCIPLINARY TEACHING

Technology is not only electronic equipments like computers and its various applications but also a kind of knowledge which uses concepts and skills that are obtained from other disciplines (such as science, mathematics, culture) and using this knowledge to solve a determined problem or covering a need by using materials,energy and tools.

Technology is also a discipline which is eligible to be performed by itself. Technology is a process where tools, buildings or systems are developed or changed to cover people's needs and wants.

Scıence And Technology

This information and technology era that we live is mostly as a result or a product of developments and changes in applied

science. Science is all the activities which are systematic watch all events that occure in nature and logical explaination of them. Technology, then, is described as human's changing activities performed by following scientific data to control nature and to create happier living conditions. In another words, technology is a reflection of applied scince applications (Arslan, 2001).

In parallel with technological developments, especially computers has been started using in educational medium to develop visual and auditory materials such as animation and simulation and as a result of this, the concept of Computer Based Teaching has come into the picture.

Computer based education is a learning method which is formed as gathering computer technologies and principles of self learning. In this method, computer is used as a learning medium and it can be adjusted as the learning speed of student (İşman, 2001. s.30; Yanpar & Yıldırım, 1999. s.58).

According to Keser (1999), computer based education is an ability of making students gain knowledge, skill and behaivors which are related to use and usage of computers as a technological tool in the class by instructors.

Especially science courses' contents are fairly eligible for applications of CBT. The reason of this is that there are lots of scientific concepts and principles in these courses and its conformity on visual transfer of course softwares to students that is prepared by using appropriate teaching techniques (Geban ve Demircioğlu, 1996). Some researches show that computer based teaching method is more effective than the otjer methods to increase interests of students in science courses (Geban, Aşkar ve Özkan, 1992; Hounshell ve Hill,1989).

Instructional technology has the capacity to enhance teaching and learning in the classroom. Through technology, the classroom community can explore the world outside the school, communicate with other students, correspond with scientists and researchers, collect and interpret real data about real phenomena, share findings, ete. In short, computers can be used in support of inquiry in science teaching, when inquiry is defined as the opportunity to "find solutions to real problem s by asking and retining questions, designing and conducting investigations, gathering and analyzing data, making interpretations, drawing conclusions, and reporting fmdings" (Krajcik, Blumenfeld, Marx, & Soloway, 2000).

Instructional technology, including, but not limited to, computers, can enhance children's learning and augment teachers' practice. Though issues of equal access to technology are crucial, how we use computers that have been placed in the classroom is also of critical importance. Educators need to concentrate on leaming how to use technology in context; matching hardware and software combinations to the needs and abilities of leamers and to the instruetional objectives (Kent & McNergney, 1999).

Atkin (1998) described the findings from the OECD study of innovations in science, mathematics and technology education and reported that the clearest trend which emerged from the 23 case studies (carried out in 13 countries) was that science and mathematics lessons were becoming more practical. In addition, there was a move to make the content of science lessons more relevant to the lives of the learners. Atkin (1998) stressed that the critical point determining the success or failure of innovations is the classroom interaction between teachers and pupils.

Case Of Scıence And Technology Areas

Previous studies show that effective technology usage supports colloboration, innovative and critical thinking, executive thinking skills besides success. Furthermore, it is emphasized that technology helps to reach students who has various and different learning skills and backgrounds (Sianjina, 2000); to develop appropriate educational programs (Schwarz, 2000); to encourage students to be informed about worldwide technological developments and to communicate (Davidson, 2000) with other communities (Koç, 2003).

In previous studies which is examined in this study, it is highlighted that an effective technology integration is a process which is composed of communicative and colloborative tasks that include making researches, analyzing data, producing and processing information by students besides gaining computer skills (Scheffler ve Logan, 1999; Jonassen, Peck ve Wilson, 1999). Therefore, it is emphasized to support cognitive behaivors such as analytical thinking depend on purpose of learning, problem solving and executive thinking skills by using technology in education (Jonassen, 2000; Williams ve Williams,1997).

Literature shows that efficient technology usage encourages students for effective, individual and self-controlled learning (Hadley ve Sheingold, 1993). On the other hand, it is explained that instructors' pedagogic and theoretical beliefs on learning and teaching is determined as an important element which affects whether technology is used and how it is used (Honey ve Moeller, 1990; Hannafin ve Freeman, 1995; Ryba ve Brown, 2000).

In related previous studies, it has been found that:
1. Technology should not be the purpose or context of teaching (Jonassen, 1991; McClintock,1992)
2. Developments of critical and executive thinking skills of learner must be aimed (Jonassen, 2000)
3. Problem solving skills can be developed much more easily by providing problem based learning opportunities to students

(Tretten ve Zachariou,1995;Boaler,1999)

4. Using hypermedia, multimedia and web based media applications which are formed by integration of audio, video, text, virtual reality and simulations helps to develop students' visual, auditory and communicative skills (Irving, 1991; Riddle, 1995; Ayersman, 1996; Thomas, 2000)

5. Student-technology interaction reflects in-class instructor-student interaction

6. Student is passive; processes such as decision making, implementation and management of learning are controlled by technology

7. Extended review and exercise activities help to develop basic thinking skills (Jonassen ve Reeves, 1996; Jonassen, 2000).

In previous studies, it is also determined that this approach is very useful for attracting students' attention and interest and increasing being managed (Ertmer, Addison, Lane, Ross ve Woods, 1999); students gained positive thoughts for technology (Kulik, 1994); students learn more in a shorter time period (Kulik ve Kulik, 1991) ; technology based teaching which includes simulations prepared by computer help provides more brain activity than traditional teaching does (Koç,2003).

According to this study, it can be said that using technology effectively and efficiently as a learning tool may cause a ocular change on students' success level, their attitudes, their communication with friends and instructors. It also helps to develop their interactive, individual learning and executive thinking skills. Effective technology integration requires some kind of changes on teaching and education system and in this process instructors and educational institutions have the biggest role.

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