

The Effect of STS Learning Model on Computer-Assisted Instruction

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Abstract. STS(Science Technology in Society) emphasizes interaction between science and technology, impact of scientific and technological advancement on a society, and vice versa. Application of STS approach at school can have quite a few benefits. For example, by introducing social issues in science education, teachers can give a more comprehensive and larger picture of the scientific system for the students. Social issues usually have interdisciplinary elements, and form a complex system. Further, STS can reveal real-life aspect of science, as it addresses scientific facts and technologies that have a direct bearing upon the society.

Keywords: STS, Science Technology in Society, Computer education, Science

1 Introduction

The term STS(Science Technology in Society) was first coined to show a close relationship among the three areas, indicating that scientific activities are part of social phenomena and should be understood in context of the social environment. Since 1970s, modern philosophy of science embraced this idea as a new approach to science that is founded upon relativism, rationalism and idealism. The ideas of STS show that a scientific method has a social nature and is a process of democratic negotiation, and imply potential and practicality of scientific knowledge. STS emphasizes interaction between science and technology, impact of scientific and technological advancement on a society, and vice versa.

STS has a theoretical background in constructivism, in particular, in relativism. Scientific perspectives of STS raises an importance of collaboration and ethical training in science education, and recommends interactive learning between teachers and students, as well as among the students. The basic idea of STS is that participatory learning methods such as debate, role-playing, practice of decision

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making, research and problem-solving can be more effective than a traditional method of lecture and passive reading of textbooks.

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2 Use of Internet materials for science education

As more schools use Internet and computer network for education, the educational environment is undergoing a dramatic change. It does not necessarily mean changes in learning materials or methods. However, it is evident that fundamental innovation of education requires changes in learning environment. Unlike conventional learning media that simply delivered knowledge and information, Internet enables a wide range of computer-related activities, expanding a possibility of altering teaching-learning methods.

Despite its powerful potentials and government policies to encourage use of Internet for education, such attempt is still in a nascent stage for a number of reasons: lack of teachers' skills, excessive work load, textbook-oriented teaching, inefficient school organization, cost burden, to name a few. Also, school education is largely biased toward preparation for college admission.

To promote use of Internet for science education, it is important to eliminate these barriers. However, some of them would take a long time, and it will be desirable to start with easier barriers to dismantle. The following lists some of the options to be considered.

First, teachers should change their perceptions toward Internet. To adjust to and cope with information society, students should be able to look up necessary information, and apply them to solve problems. To do so, they need research skills, and an ability to process them. As educational environment changes, teachers cannot meet students' needs and demands with traditional strategies and materials. They should be ready to utilize new learning methods, information and knowledge, and share them with students to meet fulfil expectations.

Second, teachers need substantial training and opportunities for advanced learning. To utilize Internet resources for science education, teachers need to acquire basic skills and knowledge first. This can be done at individual levels, but, a systematic and well-organized training program on the national level would be more effective. Many studies have shown lack of teachers' skill for Internet-based education, suggesting that the current training programs fail to offer customized, diverse training that teachers require. Also, it is necessary to expand the program to offer training to a greater number of teachers.

Third, a transition should be made from teacher-oriented to student-oriented learning. Exploration, research, constructivism, open education: all these educational trends pursue student-oriented education. And it implies that the conventional education has failed to do so. Modern society needs people who can search necessary information on their own and apply them. Student-oriented education, which can be facilitated by information media such as Internet, would help to promote students' independent thinking, creativity and cooperation.

Fourth, teachers need more discretion in designing and organizing curricula. Teachers are allowed to select and organize educational materials as long as they are in accordance with the national curricula. Thus, even within the same school, teachers could provide widely different learning materials and methodology. However, this is mostly in theory, and at school, the curricula hardly vary by grades or schools. Under this circumstance, use of Internet for science education is even more limited. To improve the condition, it is important to give discretion to science teachers to select and organize their own teaching materials.

Fifth, Internet-friendly learning environment should be established. To utilize Internet resources in science class, students should have easy access to Internet in all classrooms including computer room and science lab. The facility and space should be available to students and teachers as much as possible. In addition, an Internet-based science teaching-learning model and an evaluation tool should be developed.

3 Educational benefit of computer and CAI

Computer can be used for education in various manners, for example, CAI(Computer Assisted Instruction), CBT(Computer Based Training), and CMI(Computer Managed Instruction System). CAI indicates an education system that uses computer to deliver learning materials. CBT is widely used for corporate training. CMI uses a computer system to manage students' academic progress and information on learning resources, to enable customized education.

CAI has several benefits. First, it helps students make a progress at his or her own pace and level. Students receive instant feedback from a computer, monitor their progress, and make decisions accordingly. Second, it can provide interesting and diverse learning experiences that mostly lack in conventional education. Third, unlike a traditional one-to-many relationship between a teacher and students, CAI provides sufficient opportunities for interaction between students and the learning program. Fourth, it encourages students to make new attempts without fear of making a mistake. Fifth, latest information and technology can be available through Internet and communication network.

4 Conclusion

For effective and successful science education, the national curricula, its goal and targets should be considered in designing science curricula, and assessment should be

made for review and revision. The goal is to train students to be equipped with scientific knowledge, attitude and research skills. To offer effective science education, fully qualified teachers, facility and equipment are essential, along with rational science policy of the government that reflects the conditions and environment of a contemporary society.

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