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The effect of educational technologies and material supported science and technology teaching on the problem solving skills of 5th grade primary school student

Oğuz Serin[a],*,Nergüz Bulut Serin[b],Gizem Saygılı[c]

Cyprus International University, Faculty of Education
Giresun Bilim ve Sanat Merkezi Giresun / Merkez

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Abstract

The aim of this research is todetermine the effect of educational Technologies and material supported science and technology teaching on the problem solving skills of 5th grade primary school students fort his reason the software made for teaching the subjects of " The World, Sun and Moon" unit of the science and Technology lesson was prepared with the Macromedia Flash 8 program.The Buca Primary School in Buca, İzmir is the scope of this quasi experimental design study which is suitable fort he " Pre-test , Post-test control group" model.The participants are 80 studenrs from the 5-C and 5-F classes of Buca Primary School of the 2006-2007 academıc year.For this research, as the data collection device, researchers used "The Problem Solving Skills Scale" developed for Level I students.The six sub-dimensional Scale comprising 38 articles has a 82 cronbach Alfa reliability coefficient. In the analysis of the research data, arithmetic mean, standart deviation was used t-test was used to compare the pre-test, post-test results of the two groups. As a result of this research, it has been Seben taht the applied program has a positive influence on the problem solving skills perception of students.

Keywords: Problem solving skills; constructivism; educational tecnology; sciense and tecnology teaching; primary school students.

1. Introduction

The knowledge, skills and behaviours provided for an individual during primary school years both shape the personality of the individual and form a general platform which directs the individuals future life (Gökçe, 2003). By giving children the aims, valves, symbols of society, primary schools anable them to develop a general value system(Sönmez 1994). In this context education; The process of eg viping the individual with behaviours taht are predetermined and desired by the society (Çilenti, 1995).

Education is also a problem solving process and starting from Primary school years inidividuals should be raised as good problem solvers. The problem solving skill is the most defining roleduring an inidividualsıs inidividual

* Oğuz Serin.
E-mail address: oserin@ciu.edu.tr.

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isation and during the process of coping with the environment. Problem solving can be defined as the behaviours of displaying cognitive processes where resources concerning in and out demands are evaluated in order to provide the inidividual a way so taht one can turn situations into one's favour and establish a balance between one's interactioan with the environment (Aysan, 1988). Problem solving has the same meaning as coping with problems. Problem solving is a complicated process concerning cognitive, audial, and behaviouristic activities. Problem solving can only start when the individual understands taht one has to react at some levels. In other words problem solving is the process of finding solutions for difficulties which interfere while trying to reach an aim (Heppner and Krauskopf, 1987).Wallece (2003) states taht for every problem an aim, data and processes can be obtained. Datas are facts, words, concepts and processes which can be used to reach an aim. Processes are ways to manipulate datas in order to reach the aim. The aim is the solution of the problem. On the other hand, in real life personal problem solving is explained as directing cognitive and emotional processes, which are known as behaviouritic reactions, to an aim in order to provide hormany to inor out desires or invitatioın. According to Bonner&Rich(1988) the evoluation of one's ovon problem solving performance and the process of coping with problems as a cognitive variable.It has been identified taht influentiad problem solvers think independanhtly and creatively,possess social adequancy, are self-confident and tolerable towards vagueness (Dow&Mayer, 2004). It has been determined taht individuals who see themselves suffiicient in problem solving are more initiative in relationships,have a more positive personality perception and academically show more suitable working methods and situations (Şahin,Şahin and Heppner,1993).If it is thouth taht the problem solving skill is learned during childhood,then during school years these problem solving skills should be improved (Miller& Nunn, 2003).In the context of aducation and learning.''constructivismn''which was developed by J.Piaget and J.Dewey, points out taht information is established by the learned (Özden, 2005). Constructivism is a process in which the student explains and interprets new information with the guidance of a teacher and relating to past leasrning (Shunk,1996; Deryakulu, 2000; Akar Yıldırım, 2004; Titiz, 2005;Yapıcı; 2005) Education environments where constructivism is applied have to be arranged so taht inviduals can gain more responsibility and can be more effective during learning.Because mental constructs about items taht have to be learned,are established only by the individual.In this sense educational enviroments should be arranged so taht individuals can interact much more with their encironment;therefore,they can have a richer laerning life. Due to such pedagogical environments individuals have the chance to test the correctness of the information they had preconstructed, correct their mistakes and even replace their existing knowledge with new information (Yaşar&Others, 1998).

Education is realised throug valid learning-teaching methods (Senemoğlu, 2001). Learning is the process in which a learner explains and constructs information by regaining a perspective. In a way, education is done to assure that necessary things are learned. Learning; however, is something which take place within the student. For this reason, the target characteristics, which are to be improved by the student, are considered as crucial matters in the educational applications.This is why, the environments used to desing educational processes have to be designed in suc a way that they should allow these characteristics to improve.In order for the success of effective education, teaching and learning activities must be arranged in accordanse with contemporary educational technology. Also, for effective teaching, the teaching methods along with the educational equipments should be placed around the student in a impressive way (Demirel, 2005). Technology, is a device used to successfully resolve constructivits applications. Technologies used as devices provide meaningful thinking (Jonassen, 1997). From a constructivist point of view, the duties of technology are to support learning and make it easier (Deryakulu, 1991).Complicated information given to students is made easier by the help of technology and the opportunity of living and learning is provided (İşman, 1998).In learning environments technology usage provides students the opportunity to have a rich learning life, to have interest, to increase their motivation and to remember their previous knowledge about related topics.In this sense, educational technologies support students in active learning, in improving their problem solving skill and in constructing meaningful knowledge by gaining responsibility for self-learning (Jonassen, 1999; Oliver, 2000; Shu-Sheng, 2001). One of the significant contributions of technology to education is the preparation of effective materials. Technology is used as a tool in creating products (Jonassen, 1994b).The duty of technologies is to support the learners productions.It especially contributes to the preparation of interactive educational environments and to the multi-directional presentation of knowledge (Tezci and Gürol, 2001).Perviously, computer programs were mainly used for exercises and practies in education; however, today it is to possible to find effective interactive programs.Some of these programs which allow students to establish and develop their own knowledge and produce alternative solutions.Many educational softwares, such as

constructivist personal lesson programs, which make students active and help them establish their own knowledge, exercise and practise programs, instructive games, simulation programs, proble solving programs which have various teaching practices have started to be used in education.In educational technology supported learning environmetnts, it is possible for students to contribute to topics and education as active and interactive individuals.Learning packets made up of written, auditory and visual materials, which are neatly organised enabling students to direct themselves on their own evaluations, are programs which make individual anh group learning easier (Öncül, 2000). This usage of technology in the desing of educations allows learners to be active in learning, develop high level thinking skill and gain professional knoeledge (Collins, 1990)

Educational Technologies and Materials, which offer additional opportunities for learning and putting what you know forward, provides different learning enviroments and maintains permanent and interactive learning.Especially with abstract concept lessons like Science and Technology, the usage of educational technologies anad materials are very currucial. Sience and Technology is a lesson which has many scientific concepts and principles. For this reason, lesson materials prepared for Science and Technology subject need to be taught with appropriate teaching techniques and visuals. The starting point of constructivist Science and Technology teaching is the previous knowledge and experiences of students. The primary focus is on helping students learn scientific knowledge by making their previous experiences meaningful.In order to do this, finding out what the students know about the new topic and their previous experiences about the topic are essential (Kılıç, 2001). The aim of constructivist Science and Technology teaching is teaching science For this reason, appropriate environments for the development of scientific working skills should be established.Instead of giving students shallow information about many topics, environments where they can learn more about less topics and develop their scientific working skill should be established.In the constructivist Science and Technology teaching contents are not the aim, they are tools to help students develop their scientific working skills and do science like scientists. Education can not be considered independant from systems and technological differences which make up the structure of the society.Since one of the goals of education is to raise individuals according to what is required for the society;raising individuals who can adapt to the knowledge era is essantial (Şimşek, 2002).

1.1. Problem of the research

Do educational technologies and material supported science and technology teaching have an effect on the problem solving skills of primary sachool 5th grade students?

1.2. The Aim and Importance of the Research

The aim of the research; ascertain the effect of educational technologies and material supported science and technology teaching on the problem solving skills of primary school 5th grade students. For this aim, answers to the following questions will be sought. **1**.Is there a meaningful difference between the problem solving skills pre-test points of the experimental group were educational technologies and material supported science and technology teaching were used and the control group were educational technologies and materials were not used?**2.**Is there a meaningful difference between the problem solving skills post-test points of the experimental group were educational technologies and material supported science and technoloy teaching were used and the control group where educational technologies and materials were not used? In order to develop the educetion system, find solutios for problems, teachers have to contiıously test the feasibility of the new method and technology. This will be accomplished with experimental studies. It is assumed that the discoveries obtained by this experimental study will contribute to the development of a more functional and productive science and technology educational in primary schooland will guide practices in other fields. Also, it is assumed that the learning package prepared for the topics in "The World, Sun moon" unıt of the science and Technology lesson wiil make learning more attractive and easier and will bring variety and adjustment into the learning process. In this sense, it is believed that there will be a positive effect on the problem solving skills of Primary School Level I students.

1.3. Hypotheses

I. It was assumed that students gave sincere and occurate answers to the problem solving skills Scale developed for Science and Technology lessons,

II. The students in the experimental and control groups were affected at the same lewel from control variables which influence the problem solving skill being the dependent variable of the research,

III. During the research there was no kind of interaction between the researcher of the study and the students in the experimental and control groups that would affect the result of the reseerch.

2. Methodology

2.1. Model of the research

In this research, the effect of educational technologies and material supported science and technology teaching on primary school 5 th grade student's problem solving skills has been researched. The research is a quasi experimental study suitable to the "pre-test post –test control group" model which is an actual trial model. There are two randomly formed groups in this research; an experimental and control group. The groups have been identified as an experimental group and approach oriented teaching of lessons, appropriate to MEB (Ministryof Education) Science and Technology program, was conducted and in the experimental group constructivist approach oriented educational technologies and material supported teaching was contucted. In this research, in the experimental group, for preidentified special targets, in a systematic way, enables students to guide themselves, enables students to evaluate their learnings and provides documentaries and games related to topics was used. The educational software used in the research was prepared with the macromedia flash & program. The program can also be used online where an atmosphere is provided for students to ask questions. In this model both groups were tasted prior the experiment and afterwards.

2.2. Scope and participants

The scope of this experimental research is Buca Primary School in Buca, İzmir. The participants are 80 students from classes 5-C and 5-F of Buca Primary school of academic year 2006–2007.

2.3. Data collection means

The data collection means used for the research is "The Problem Solving Skill Scale" developed for Level I students. The six sub-dimensional scale, which has a 82 Cronbach Alfa reliability coefficient, is made up of 38 articles.

3. Findings

This part contains the findings obtained according to the aim of the research. The points recieved by experimental and control groups from the problem solving skills scale in order to evaluate the effect of educational technologies and materials on students problem solving skills as a learning toll were taken into consideration. The difference between the pre-test and post-test points of both the experimental and control groups have been compared. The findings obtained from the T-test, which has been done in order to identify if there is a significant difference between the experimental and control groups, are given below in tables.

Table 1:"Problem Solving Skills Scale" Pre-test Points of Experimental and Control Groups

Group	N	$\overline{X}$	ss	t	P
Experimental	40	187,725	29,818	1,496	0,139
Control	40	176,750	35,535		

Table 2:"Problem Solving Skills Scale" Post-test Points of Experimental and Control Groups

Group	N	$\overline{X}$	ss	t	P
Experimental	40	174,375	26,152	**2,667**	**0,009***
Control	40	191,000	29,500		

When the above tables are analysed as a result of the experiment it is seen that the mean of the experimental group decreases from 187, 725 to 174, 375 and the mean of the control group from 176, 75 to 191.000.If a high point mean is considered as a negative perception from the problem solving skill point of view then it is possible to say that the experimental group's problem solving skiils perceptions are affected in a positive way. For this reason, as a result of the research, it can be said that the applied program has increased the sutudents problem solving skills.

4. Discussion and Recommendations

As a result of this research, which has been done to identify the effect of educational technology teaching on problem solving skills by comparing the differences between the pre-test and post-test points of the experimental and control groups, it has been seen that the applied program has a positive affect on the students problem solving skills perception. The research findings are supported with the research findings of serin (2001). Similar researches have shown that computer assisted learning increases the interest in sciense lessons much more than other methods (Geban, Aşkar and Özkan, 1992; Hounshell and Hill, 1989;). In various researches, which support a constructivist learning results have been put forward: students improve their commenting skills and ağabeylities in applying their knowledge in other fields, they actively participate in learning, they take more responsibility during the learning process and develop permanent learning (Bodner, 1990; Laverty & Mc Garwey, 1991; Hand & Treogust, 1991, Akt. Özmen, 2004).Nowadays, computers-being the indispensable devices of contemporary life are trying to be used effectively in science teaching. Kesercioglu and his friends (2001) mathematics, science and tecnology has a big inflivence on science education.Technology has spread among the society, made changes inevitable in education and increased expectations. Nowadays the improvements recorded in educational technology has enabled individuals to develop eguipped with much more gualities within the educational system. Asit is known, computers have entered the learning process not as a choice but as a completing and reinforcing item of the system (Namlu, 1999). The usage of computers as educational enriching devices in learning and teacher assistans is due to already prepared softwares (Demirci, 2003; Altın, 2001; Kabapınar, Özdener ve Salan, 2000). However, these softwares are limited with the information and examples in boks. For this reason, the following recommendations have been suggested to develop individual softwares:

- It must be mode sure that lesson softwares are designed according to aim, are more useful in learning anda re have guality.
- It is believed that the increasement of the number of softwares, which have an important role in effective learning, will be benefitial to learning especially done with a constructivist philosohy.
- When lesson softwares are prepared theories related to how multi atmosphere applications will be designed should be focused on more.
- Lesson material production shows differences in quality compared to computer software production. This difference must be taken into consideration more than before.Lesson softwares should not be prepared by computer software experts.

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