THE EFFECT OF COMPUTER ASSISTED INSTRUCTION ON FOURTH GRADE PRIMARY STUDENTS' ACHIEVEMENTS AND ATTITUDES TOWARDS SCIENCE AND TECHNOLOGY LESSON

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Abstract

The aim of this study is to determine the effect of computer assisted instruction on fourth grade primary students' achievements and their attitudes towards science and technology lesson. In this study, quasi-experimental design was utilized. There were two groups consisting of totally 55 fourth grade primary students who were selected with convenient sampling method from Korfez district of Kocaeli in Turkey. One of the groups was experimental group and the other was control group. The experimental group was taught using the computer asisted instruction based on constructivist approach and the control group was taught using constructivist approach currently used in primary education curriculum of Turkish Education System. The data were collected by means of attitude scale towards science and technology lesson (ASTSTL) and achievement test (AT). The data were analyzed using SPSS statistical packet program. The findings indicated that in terms of both achievment test and attitude scale there was a statistically significant difference between the post test scores of the groups in favor of experimental group.

Keywords: Computer, science and technology lesson, attitude, achievement, primary education.

INTRODUCTION

The fact that technology has become very important in human life at the present time is now undeniable since improving technology has brought great easiness in every field from military to industry, from healt to education (Hançer and Tüzemen, 2008; Kara and Kahraman, 2008). In addition, a lot of social systems such as industry, economy and communication expect especially educational institutions to train individuals who can use the technology. This expectation includes in not only teaching usage of technology but also using of them in instructional activities (Hançer and Yalçın, 2007). Computers undoubtedly are one of these technologies which can be used in instructional activities.

Today, advances in computer technology have caught the attention of many educators and researchers. According to them, computers have been accepted as a indispensable part of educational system (Sins *at al.*, 2005; Gandole *at al.*, 2006; Yushau, 2006; Rajasenkar and Vaiyapuri, 2007; Ogunkola, 2008). Also, due to its positive effect on increase students' attention and curiosity which is important in the

conceptual learning, the use of computers in education is getting spread widely (Gönen *at al.*, 2006).

The fact that computers are used in education and learning process caused the using of computer assisted instruction method. Computer assisted instruction is an instructional method using the computers which made learning easy, increase students' motivation and their learning speeds. This instruction method is formed by combining computer technology and learning principles by oneself (Hançer and Tüzemen, 2008).

Because today's students are growing with visual tools like computer, it is impossible to get these students' interest by traditional instruction methods (Kara and Kahraman, 2008). Therefore, efforts should be taken now to direct the lessons away from the traditional methods to computer assisted instructional methods (Prokop *at al.*, 2007).

Especially science compared to other discipline are convenient the use of computer assisted instructional applications (Geban *at al.*, 1992; Linn, 2003). Perhaps more than other fields, science teaching is thought to have benefited and established a stronger intrinsic link with the development of computers in recent times. Recently, many researches have showed that computer assisted instructional methods are more effective than the other methods in promoting the student's achievements and interests towards science lessons (Christmann and Badgett, 1999; Chang, 2000; Hsu and Thomas, 2002).

Similarly, it is important to understand students' attitudes in supporting their achievements and interests toward science. Attitude is an inner psychic state influencing behaviour. Therefore, we can understand an inner state from actions and words. For instance, we may presume that a person actively avoiding a computer has a negative attitude towards it. Attitude is not an inborn, instinct phenomenon; it mainly depends upon person's experiences and its impact in a new situation. Consequently, attitudes are formed in the process of experience and their change is possible due to the internal and external factors (Saparniene *at al.*, 2005).

Studies have showed that there is a significant relationship between attitudes to science and science achievement and the positive attitudes towards science increase achievement (Schibeci and Riley, 1986; Cook and Mulvihill, 2008). Therefore, it is very important that gaining positive attitudes and behaviors towards science which was appeared as a result of observations of nature and natural realities and teaching it effectively and consciously (Kara and Kahraman, 2008). Studies have also showed that computer assisted instructional applications effect students' achievements and attitudes in science (Hounshell and Hill, 1989; Yenice, 2003; Akgün, 2005; Çepni *at al.*, 2006; Gandole *at al.*, 2006). In the world and in Turkey, a lot of studies have been done on computer assisted instruction. These studies revealed different results. But, most studies found computer assisted instruction as useful for students' development (Kara and Kahraman, 2008). For example, the study of investigation of effectiveness of using computer-assisted supplementary instruction on teaching the mole concept by Yalçınalp *at al.* (1995) found out that the achievements and attitudes of the students undergoing computer assisted instruction significantly increased more than those not undergoing

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computer assisted instruction. Similar results were also identified by Kara and Kahraman (2008).

Similarly, in a study carried out on the teacher candidates by Pektaş *at al.* (2006) it was found out that the students on the computer assisted education group showed statistically higher achievement than those students in the control group taught with traditional methods.

Taş, Köse and Çepni (2006) found out that the computer assisted instruction group increased their success more about photosynthesis when compared with the traditionally designed science instruction group. Besides, when compared with the control group, an significantly positive difference appeared in experiment group students in their attitudes toward science as a school subject.

Pektaş *at al.* (2009)' study showed that computer supported teaching is more effective on the student success in the sound and light unit than the traditional teaching methods.

In another study, Chang (2000) investigated the comparative efficiency of computer assisted instruction and traditional teaching methods on tenth graders' learning of earthscience Taiwan. Results include that students in the experimental group had significantly higher achievement scores than did students in the comparison group; there were also statistically significant differences in favor of computer assisted instruction on sudents' test performance, especially on the knowledge and comprehension test items, but not on the application test items. Shortly, the findings by Chang (2000) suggest that incorporating computer assisted instruction into secondary schools has promise in helping students' grasp of earth science concepts.

In addition to above studies, some studies suggest that the success of computer assisted instruction depends on the quality of educational software. These studies also emphasize that the quality of educational software is associated with learning theory which educational software is based upon (Laney, 1990; Güzeller and Korkmaz, 2007; Atam and Tekdal, 2010). Besides, most of studies towards this subject stand on prominently computer assisted instruction based constructivist learning approach (Hançer and Yalçın, 2007; Saka and Akdeniz, 2006).

In literature, despite the fact that there are a lot of studies towards both constructivist learning approach and computer assisted instruction (Morrell, 1992; Huppert *at al.*, 2002; Kim, 2005; Prokop *at al.,* 2007; Yalçın and Bayrakçeken, 2010), there are few studies towards computer assisted instruction based on constructivist learning approach (Hançer and Yalçın, 2007; Saka and Akdeniz, 2006). Besides, most of present studies on computer assisted instruction based on constructivist learning approach is not relating to biology based subjects at primary school level in Turkey (Ocak and Ocak, 2002; Yenice *at al.*, 2003; Akgün, 2005; Hançer and Yalçın, 2009). Moreover, it seems that most studies focused on science subjects in higher education level (Çekbaş *at al.*, 2003; Aydoğdu, 2006; Hançer & Tüzemen, 2008) and most of these studies were conducted on teachers and pre-service teachers (Aydoğdu *at al.*, 2008; Çelik and Bindak, 2005; Gerçek *at al.*, 2006; Pektaş *at al.*, 2006).

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The primary education has a key role in training scientists of future. The reason for this is that the foundation for training chemist, physicist and biologist of future lies in primary education (Akgün, 2005). This study therefore examines the effect of computer assisted instruction on fourth grade primary education students' achievements and attitudes towards science and technology lesson.

This study focuses on the following questions:1. Is there any effect of computer assisted instruction on fourth grade primary education students' attitudes towards science and technology lesson? 2. Is there any effect of computer assisted instruction on fourth grade primary education students' achievements towards science and technology lesson?

METHOD

Research Design: In this study, quasi-experimental design was utilized (McMillan and Schumacher, 2006). There are two groups as experiment group and control group. The experimental group was taught using the computer asisted instruction, which is based on constructivist approach and the control group was taught using constructivist approach in primary education curriculum of Turkish Education System. The groups were randomly assigned to either experiment group or the control group.
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Sample: The sample of this study consisted of 55 fourth grade primary education students (30 in the experimental group and 25 in the control group) who were selected from a public primary school which was determined convenient sampling method in Korfez/Kocaeli (Table 1).

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Table 1. The gender of distributions in groups

Group	Gender	f	%
Experimental	Male	14	46,7
	Female	16	53,3
Control	Male	11	44,0
	Female	14	56,0

n=55

Research Instruments:

Achievement test (AT). A 20-item multiple choice achievement test (AT) was constructed to measure the students'achievements on Skeletal System subject in science and technology lesson. AT was prepared according to the primary education curriculum in Turkey. Thus, the items of AT reflect the particular topics. To ensure the content validity of AT, both the distribution of questions was done by taking notice the subjects' weights and one expert and one teacher' opinion was taken. The pilot application was executed to determine the reliability of AT. For this aim, AT was initially applied to 35 fifth grader students who learned this subject previously and they were selected with

convenient sampling method. The reliability of AT was calculated with KR-20 and it was 0.72. The discriminating power of AT in the upper 27 % and lower 27% groups was desired level (t= -12.000, df= 16, p<0.05).

Attitude scale towards science and technology lesson (ASTSTL). In this study, Science Attitude Scale by Geban, Ertepınar, Yılmaz, Atlan and Şahpaz (1994) was adapted. The adaption involved replacing the word "science lesson" with the word "science and technology lesson". It was expressed by authors that the reliability of this scale was 0.83. In this study, ASTSTL was divided into two sections. The first part of ASTSTL obtained information on demographic variables such as gender, course. The second part of ASTSTL consisted of totally 15 items. 11 of these items positively worded items which were scored on a five-point Likert scale: Strongly Agree 5, Agree 4, Undecided 3, Disagree 2 and Strongly Disagree 1, while of 4 negatively worded items were scored in the reverse manner.

Computer software. Computer software used in this study was a prepared package called the Ozer Educational Program and was made by Ozer Publishing. This software was reviewed by researcher and teacher who participated in this study and was found sufficient to contain many of the required features of computer assisted instruction. For example, this software included in many significant concepts regarding Skeletal System subject. In addition to subject representation, the software included in feedbacks, interactions, evaluation tests etc.

Procedure and data analysis: This study was conducted in the fall term of 2008-2009 academic year. The study lasted totally about 3 weeks as pre-test, activities and post-test. Participants in the study were applied the two instruments (ASTSTL and AT) as pre-test and pos-test. In this study, science and technology lesson is taught by the classes' own science teacher in order to prevent researcher's prejudice effect the study. The teacher instructed her students by using constructivist approach in primary education curriculum, in control group and by using computer assisted instruction which is based on constructivist approach, in experimental group. After the treatment, the data were analyzed using the SPSS statistical packet program. Group comparisons were done by using means, mean differences, independent samples t-test and analyses of covariance (ANCOVA). 95% significance level was taken into account in statistical analysis.

5E model of Rodger Bybee was used in experimental group where subject was taught with computer assisted instruction based constructivist learning approach.

In experimental group, the activities based 5E model were carried out according to the following stages in the light of Hançer and Yalçın (2009) and Gül and Yeşilyurt (2011):

1. **Enter/Engage:** In this stage, the students were asked a question regarding subject for creating interest and then, an environment of class debate was created by showing simulations, scenario, pictures, videos etc. in computing environment. Thus, students' prior knowledge was determined.

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2. **Explore:** In this stage, the students were given brief information. And then, the students were asked to study as group in teacher quidance. Working as group, students were encauraged to work together without direct instruction from the teacher. The teacher also asked the students to find cause-conclusion relationship by means of scenarios, videos, simulations etc. in computing environment.

3. **Explain:** In this stage, the students were provided to explain concepts and definitions in their own words. To correct missing or incorrect information regarding subject, the teacher made explains and students were re-watched simulation, videos etc. in computing environment.

4. **Elaborate:** In this stage, the students were asked various questions regarding subject to elaborate and compare their opinions. Besides, teacher tried to encaurage students to apply or extend the concepts and skills in new situations.

5. **Evaluate:** In this stage, the teacher asked the students to solve tests in computing environment for assessing their own learning and group-process skills.

In control group, the activities were carried out according to constructivist learning approach at present curriculum of primary education, without computer assisted instruction.

FINDINGS AND RESULTS

1. **The findings regarding the effect of computer assisted instruction on fourth grade students' attitudes towards science and technology lesson;**

The first phase of this study was to determine if there was any effect of computer assisted instruction on the fourth grader students' attitudes towards science and technology lesson. The treatment groups' pre-test and post-test means, standard deviations and mean differences in ASTSTL were calculated as shown in Table 3.

In addition, an independent samples t-test was done in order to determine if there was a difference between treatment groups' pre-test attitudes (Table 2). The t-test revealed that there was a significant difference in treatment groups' pre-test attitudes towards science and technology lesson in favour of the control group ($p < 0.05$). This finding has indicated that the students' preliminary attitudes in experimental and control group is not same.

Table 2. Independent samples t-test results of treatment groups on ASTSTL before treatment

Treatment groups	n	t	df	p
Experimental	30	-3.517	53	0.001*
Control	25			

*$p < 0.05$

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When we look into Table 3, both groups'attitudes towards science and technology lesson seem at high level before and after treatment. But, while the treatment brought a pretty appreciable increase of 19.57% in the experimental group' post test mean attitude score, it brought a little increase of 5.37% in the control group' post test mean attitude score.

Table 3. Means, standard deviations and mean difference of treatment groups on ASTSTL before and after treatment

Treatment groups	Pre-test mean	SD	Post-test mean	SD	Mean difference
Experimental	54.17	6.00	64.77	9.37	10.6
Control	58.80	2.96	61.96	8.94	3.16

Maximum score=75
SD=Standart deviation

In study, an analysis of covariance (ANCOVA) was computed using their pre-test ASTSTL scores as covariate in order to confirm if there were any significant differences in their post-test means attributable to treatment effect on their attitudes towards science and technology lesson (Table 4).

Table 4 shows that there is significant differences between experimental and control group' post-test attitudes towards science and technology lesson. Moreover, groups' pre-test attitudes towards science and technology lesson affect their post-test attitudes towards science and technology lesson at statistically significant level.

Table 4. Analyses of covariance on students' attitudes towards science and technology lesson

Source of variation	df	MS	F
Treatment	1	573.58	8.94*
Covariate	1	1129.05	17.60*

ASTSTL pre-test scores as covariate
* $p<0.05$

2. **The findings regarding the effect of computer assisted instruction on fourth grade students' achievements towards science and technology lesson;**

The second phase of this study was to determine if there was any effect of computer assisted instruction on the fourth grader students' achievement towards science and technology lesson. The treatment groups' pre-test and post-test means, standard deviations and mean differencess in AT were calculated as shown in Table 6.

In addition, an independent samples t-test was done in order to determine if there was a difference between treatment groups' pre-test AT scores (Table 5). The t-test revealed that there was no a significant difference in treatment groups' pre-test AT scores (p>0.05).

Table 5. Independent samples t-test results of treatment groups on AT before treatment

Treatment groups	n	t	df	p
Experimental	30	1.503	53	0.139
Control	25			

As looked into Table 6, both groups'AT scores seem at low level before treatment. But, while the treatment brought a pretty appreciable increase of 64.42% in the experimental group' post test mean achievement score, it brought a little increase of 34.93% in the control group' post test mean achievement score.

Table 6. Means, standard deviations and mean difference of treatment groups on AT before and after treatment

Treatment groups	Pre-test mean	SD	Post-test mean	SD	Mean difference
Experimental	6.83	2.55	11.23	2.66	4.40
Control	5.84	2.30	7.88	2.67	2.04

Maximum score=20

In study, an analysis of covariance (ANCOVA) was computed using their pre-test AT scores as covariate in order to confirm if there were any significant differences in their post-test AT scores attributable to treatment effect on their achievement test scores (Table 7).

Table 7 shows that there is significant differences between experimental and control group' post-test AT scores. Moreover, groups' pre-test AT scores affect their post-test AT scores at statistically significant level.

Table 7. Analyses of covariance on students' achievements towards AT

Source of variation	df	MS	F
Treatment	1	84.727	26.352*
Covariate	1	208.819	64.949*

AT pre-test scores as covariate

* $p < 0.05$

CONCLUSION AND DISCUSSION

This study is important to be able to determine the effect of computer assisted instruction on fourth grade primary students' achievements and attitudes towards science and technology lesson.

Examining the **students'attitudes towards science and technology lesson**, it was found out that there is a statistically significant difference ($p < 0.05$) between attitudes in favour of the control group before the treatment (Table 2), and in favour of the experimental group after the treatment (Table 4). In addition, it was found out that mean

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difference value between attitudes after the treatment was higher in favour of experimental group (Table 3). This increase on experimental group' post-test scores may be caused by computer assisted instruction which used in addition to constructivist learning approach. Similar to this study, Hançer and Yalçın (2007) and Gül and Yeşilyurt (2011) and supported the findings of this study by emphasizing that usage of computer assisted instruction in constructivist learning environment had probably motivated the students to have more positive attitudes towards lesson.

One of the most sensitive spots of this study is that, there is no a statistically significant difference ($p>0.05$) in treatment groups' pre-test **achievement test** scores (Table 5) and both groups' achievement scores are low level (Table 6). It is expected that experimental and control group' pre-test achievement scores are low level before the application because both groups had not been taught musculosceletal system subject before the application. But, after the application, there was a statistically significant difference in favour of experimental group (Table 7) . It may be caused by positive effect of computer assisted instruction. In the other words, it is an expected situation that the learning process of student being more active in computer asisted learning process developes more positively. This finding is in accordance with study findings which were performed before (Chang, 2000; Soyibo and Hudson, 2000; Saka and Akdeniz, 2006; Kara and Kahraman, 2008).

In study, it was also found out that mean difference value between students' achievement scores was higher in favour of experimental group (Table 6). This increase on experimental group' post-test achievement scores may be an indicator that computer assisted instruction based constructivist learning approach affects students'achievements positively and that educational softwares prepared with an accordance learning approach increase success in learning process. These findings are supported by Rezaei ve Katz (2002) and Özerbaş (2007).

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The findings from this study is limited to fourth grade primary education students. Therefore, the different studies which can be done at different districts or different education levels and on a larger sample may give more striking and more important results towards computer assisted instruction.

The some studies towards computer assisted instruction have showed that usage of educational softwares in learning process incereases students'achievements at science and technology lesson (Derviş and Tezel, 2009; Pekaş at al. 2009; Atam and Tekdal, 2010). The studies have also showed that teaching of the subjects at science and technology lesson with computer assisted instruction affects positively students'achievements. Therefore, based on computer assisted instruction, the studies towards different subjects can be carried out.

REFERENCES

Akgün, E. (2005). Bilgisayar destekli ve fen bilgisi laboratuvarında yapılan gösterim deneylerinin öğrencilerin fen bilgisi başarısı ve tutumları üzerindeki etkisi. Yüzüncü Yıl Üniversitesi Elektronik Eğitim Fakültesi Dergisi, 2(1): 1-20.

Atam, O. and Tekdal, M. (2010). Fen ve teknoloji dersi ısı-sıcaklık konusunda hazırlanan simulasyon tabanlı bir yazılımın ilköğretim 5. sınıf öğrencilerinin akademik başarılarına ve kalıcılığa etkisi. Eğitim Teknolojileri Araştırma Dergisi, 1(2): 1-18.

Aydoğdu, C. (2006). Bilgisayar destekli kimyasal bağ öğretiminin öğrenci başarısına etkisi. Bayburt Eğitim Fakültesi Dergisi, 1(1): 80-90.

Aydoğdu, B., Özcan, E. and Ergin, Ö. (2008). Fen bilgisi öğretmen ve öğretmen adaylarının bilgisayara karşı tutumları ve bilgisayar kullanma düzeyleri. VIII. Uluslararası Eğitim Teknolojileri Konferansı (IETC-2008), 6-9 Mayıs, Anadolu Üniversitesi, Eskişehir, 265-271.

Chang, C.Y. (2000). Enhancing tenth graders' earth-science learning through computer-assisted instruction. Journal of Geoscience Education, 48: 636.

Christmann, E. and Badgett, J. (1999). A comparative analysis of the effects of computer-assisted instruction on student achievement in differing science and demographical areas. Journal of Computers in Mathematics and Science Teaching. 18(2): 135-143.

Cook, M. and Mulvihill, T.M. (2008). Examining US college students' attitudes towards science: Learning from non-science majors. Educational Research and Review, 3(1): 38-47.

Çekbaş, Y., Yakar, H., Yıldırım, B. and Savran, A. (2003). Bilgisayar destekli eğitimin öğrenciler üzerine etkisi. The Turkish Online Journal of Educational Technology, 2(4): 76-78.

Çelik, H.C. and Bindak, R. (2005). İlköğretim okullarında görev yapan öğretmenlerin bilgisayara yönelik tutumlarının çeşitli değişkenlere göre incelenmesi. İnönü Üniversitesi Eğitim Fakültesi Dergisi, 6(10): 27-38.

Çepni, S., Taş, E. and Köse, S. (2006). The effects of computer-assisted material on students' cognitive levels, misconceptions and attitudes towards science. Computers & Education, 46: 192-205.

Derviş, N. and Tezel, Ö. (2009). Fen ve teknoloji dersinde bilgisayar destekli öğretimin öğrencilerin başarılarına ve bilimsel düşünme becerilerine etkisi. The First International Congress of Educational Research, 1-3 May, Çanakkale, Turkey.

Gandole, Y.B., Khandevale, S.S. and Mishra, R.A. (2006). A comparison of students'attitudes between computer software support and traditional laboratory practical learning environments in undergraduate electronics science. E-Journal of Instructional Science and Technology, 9(1). Retrieved June 23 2009 from http://www.usg.edu.av/electpub/e-jist/docs/vol9_no1/papers/current_practice7gandole_khandevalemishra.htm.

Geban, Ö., Aşkar P. and Özkan, İ. (1992). Effects of computer simulations and problem solving approaches on high school students. Journal of Educational Research, 86(1): 5-10.

Geban, Ö., Ertepınar, H., Yılmaz, E., Atlan, A. and Şahpaz, F. (1994). Bilgisayar destekli eğitimin öğrencilerin fen bilgisi başarılarına ve fen bilgisine ilgilerine etkisi. I. Ulusal Fen Bilimleri Eğitimi Sempozyumu, (s.1-2), Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi, İzmir.

Gerçek, C., Köseoğlu, P., Yılmaz, M. and Soran, H. (2006). Öğretmen adaylarının bilgisayar kullanımına yönelik tutumlarının çeşitli değişkenler açısından incelenmesi. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 30: 130-139.

Gönen, S., Kocakaya, S. and İnan, C. (2006). The effect of the computer assisted teaching and 7E model of the constructivist learning methods on the achievements and attitudes of high school students. The Turkish Online Journal of Educational Technology, 5(4): 82-88.

Gül, Ş. and Yeşilyurt, S. (2011). Yapılandırmacı öğrenme yaklaşımına dayalı bilgisayar destekli öğretimin öğrencilerin tutumları ve başarıları üzerine etkisi. Balıkesir Üniversitesi Necatibey Eğitim Fakültesi Dergisi (baskıda).

Güzeller, C. and Korkmaz, Ö., 2007. Bilgisayar destekli öğretimde bir ders yazılımı değerlendirmesi. Kastamonu Eğitim Dergisi, 15(1): 155-168.

Hançer, A.H., Yalçın, N. (2007). Fen eğitiminde yapılandırmacı yaklaşıma dayalı bilgisayar destekli öğrenmenin bilgisayara yönelik tutuma etkisi. Kastamonu Eğitim Dergisi, 15(2): 549-560.

Hançer, A.H. and Tüzemen, A.T. (2008). A research on the effect of computer assisted science teaching. World Applied Sciences Journal, 4(2): 199-205.

Hançer, A.H. and Yalçın, N. (2009). Fen eğitiminde yapılandırmacı yaklaşıma dayalı bilgisayar destekli öğrenmenin akademik başarı ve kalıcılığa etkisi. C.U. Sosyal Bilimler Dergisi, 33(1): 75-88.

Hounshell, P.B. and Hill, S.R. (1989). The microcomputer and achievement and attitudes in high school biology. Journal of Research in Science Teaching, 26(6): 543-549.

39

Huppert, J., Lomask, S.M. and Lazarowitz, R. (2002). Computer simulations in the high school: students' cognitive stages, science process skills and academic achievement in microbiology. International Journal of Science Education, 24(8): 803-821.

Hsu, Y.S. and Thomas, R.A. (2002). The impacts of a web-aided instructional simulation on science learning. International Journal of Science Education, 24(9): 955-979.

Kara, İ. and Kahraman, Ö. (2008). The effect of computer assisted instruction on the achievement of students on the instruction of physics topic of 7th grade science course at a primary school. Journal of Applied Sciences, 8(6): 1067-1072.

Kim, J.S. (2005). The effects of a constructivist teaching approach on student academic achievement, self-concept, and learning strategies. Asia Pacific Education Review, 6(1): 7-19.

Laney, D. (1990). Micro computers and social studies. OCSS Rewiev, 26: 30-37.

Linn, M.C. (2003). Technology and science education. Starting points, research programs, and trends. International Journal of Science Education, 25(6): 727-758.

McMillan, J.H. and Schumacher, S. (2006). Research in education: Evidence-based inquiry. 6th. Edition, Printed in the United States of America.

Morrell, P.D. (1992). The effects of computer assisted instruction on student achievement in high school biology. School Science and Mathematics, 92(4): 177-181.

Ocak, İ. and Ocak, G. (2002). Bilgisayar destekli sunumun sınıf öğretimine ek olarak ve sınıf öğretiminden bağımsız olarak canlılar çeşitlidir ünitesinde akademik başarı ve kalıcılığı etkileme düzeyi. G.Ü. Kırşehir Eğitim Fakültesi Dergisi, 3(2): 19-27.

Ogunkola, B.J. (2008). Computer attitude, ownership and use as predictors of computer literacy of science teachers in Nigeria. International Journal of Environmental & Science Education, 8: 53-57.

Özerbaş, M.A. (2007). Yapılandırmacı öğrenme ortamının öğrencilerin akademik başarılarına ve kalıcılığına etkisi. Türk Eğitim Bilimleri Dergisi, 5(4): 609-635.

Pektaş, M., Türkmen, L. and Solak, K. (2006). Bilgisayar destekli öğretimin fen bilgisi öğretmen adaylarının sindirim sistemi ve boşaltım sistemi konularını öğrenmeleri üzerine etkisi. Kastamonu Eğitim Dergisi, 14(2): 465-472.

Pektaş, H.M., Çelik, H., Katrancı, M. and Köse, S. (2009). 5. Sınıflarda ses ve ışık ünitesinin öğretiminde bilgisayar destekli öğretimin öğrenci başarısına etkisi. Kastamonu Eğitim Dergisi, 17(2): 649-658.

Prokop, P., Tuncer, G. and Chuda, J. (2007). Slovakian student's attitudes toward biology. Eurasia Journal of Mathematics & Technology Education, 3(4): 287-295.

Rajasekar, S. and Vaiyapuri, R. P. (2007). Higher secondary school teachers' computer knowledge and their attitude towards computer. E Journal of All India Association for Educational Research. 19(1&2): 68-69.

Rezaei, A.R. and Katz, L. (2002). Using computer assisted instruction to compare the inventive model and the radical constructivist approach to teaching physics. Journal of Science Education and Technology, 11(4): 367-380.

Saka, A. and Akdeniz, A.R. (2006). Genetik konusunda bilgisayar destekli materyal geliştirilmesi ve 5E modeline göre uygulanması. The Turkish Online Journal of Educational Technology, 5(1): 129-141.

Saparniene, D., Merkys, G. and Saparnis, G. (2005). Students` attitudes towards computer: Statistical types and their relationship with computer literacy. Paper presented at the European Conference on Educational Research, University College (Dublin, Ireland, Sep 7-10, 2005. Retrieved May 29 2008 from http://eric.ed.gov/ERICWebPortal/custom/portlets/recordDetails/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=ED494972&ERICExtSearch_SearchType_0=no&accno=ED494972

Schibeci, R.A. and Riley, J.P. (1986). Influence of students' background and perceptions on science attitudes and achievement. Journal of Research in Science Teaching, 23(3): 177-187.

Sins, P.H.M., Savelsbergh, E.R. and Joolingen, W.R. (2005). The difficult process of scientific modelling: An analysis of novices'reasoning during computer-based modelling. International Journal of Science Education, 27(14): 1695-1721.

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Soyibo, K. and Hudson, A. (2000). Effects of computer-assisted instruction (CAI) on 11th graders' attitudes to biology and CAI and understanding of reproduction in plants and animals. Research in Science & Technological Education, 18(2): 191-199.

Taş, E., Köse, S. and Çepni, S. (2006). The effects of computer-assisted instruction material on understanding photosynthesis subject. Internatinal Journal of Environmental and Science Education, 1(2): 163–171.

Yalçın, F.A. and Bayrakçeken, S. (2010). The effect of 5E learning model on pre-service science teachers' achievement of acids-bases subject. International Online Journal of Educational Sciences, 2(2): 508-531.

Yalçınalp, S., Geban, Ö. and Özkan, İ. (1995). Effectiveness of using computer-assisted supplementary instruction for teaching the mole concept. Journal of Research in Science Teaching, 32: 1083-1095.

Yenice, N. (2003). Bilgisayar destekli fen bilgisi öğretiminin öğrencilerin fen ve bilgisayar tutumlarına etkisi. The Turkish Online Journal of Educational Technology, 2(4): 79-85.

Yenice, N., Sümer, Ş., Oktaylar, H.C. and Erbil, E. (2003). Fen bilgisi derslerinde bilgisayar destekli öğretimin dersin hedeflerine ulaşma düzeyine etkisi. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 24: 152-158.

Yushau, B. (2006). Computer attitude, use, experience, software familarity and perceived pedagogical usefulness: The case of mathematics professors. Eurasia Journal of Mathematics, Science and Technology Education, 2(3): 1-7.

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BİLGİSAYAR DESTEKLİ ÖĞRETİMİN İLKÖĞRETİM DÖRDÜNCÜ SINIF ÖĞRENCİLERİNİN FEN VE TEKNOLOJİ DERSİNE YÖNELİK BAŞARILARI VE TUTUMLARINA ETKİSİ

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Genişletilmiş Özet

Problem: Bu çalışmanın amacı bilgisayar destekli öğretimin ilköğretim 4. sınıf öğrencilerinin fen ve teknoloji dersine yönelik başarı ve tutumlarına etkisini araştırmaktır.

Yöntem: Çalışmanın örneklemini Kocaeli ilinin Körfez ilçesinden uygun örnekleme yolu ile belirlenmiş bir ilköğretim okulunun 4. sınıfında öğrenim gören toplam 55 öğrenci oluşturmaktadır. Çalışmada ön-test/son-test kontrol gruplu yarı deneysel araştırma yöntemi kullanılmıştır. Söz konusu yöntemde uygulamalar kontrol grubunda MEB ilköğretim müfredatının öngördüğü şekilde yapılandırmacı öğrenme yaklaşımı ile yürütülürken, deney grubunda ise yapılandırmacı öğrenme yaklaşımına dayalı bilgisayar destekli öğretimle yürütülmüştür. Çalışmada veri toplama aracı olarak araştırmacılar tarafından geliştirilen başarı testi ile literatürden yararlanılarak elde edilen fen ve teknoloji dersine yönelik tutum ölçeğinden yararlanılmıştır.

Bulgular: Çalışmada elde edilen bulgular incelendiğinde öncelikle öğrencilerin "fen ve teknoloji dersine yönelik tutumları"ndan elde edilen puanlar arasında uygulama öncesinde kontrol grubu lehine, uygulama sonrasında deney grubu lehine istatistiksel olarak anlamlı bir farklılık olduğu ortaya çıkmıştır. Ayrıca, tutum puanları arasındaki ortalama fark değerleri incelendiğinde, uygulama sonrasında bu değerin yapılandırmacı öğrenme yaklaşımına dayalı bilgisayar destekli öğretim yönteminin uygulandığı deney grubu lehine yüksek olduğu görülmektedir. Deney grubu öğrencilerinin fen bilimlerine yönelik son-test puanlarındaki bu artış, yapılandırmacı öğrenme ortamında kullanılan bilgisayar destekli uygulamanın bir sonucu olarak düşünülebilir. Çalışmada, öğrencilere uygulanan "başarı testinde" ise, uygulama öncesi elde edilen ön test puanları arasında istatistiksel olarak anlamlı bir farklılığın olmadığı ve her iki grubun başarı testinden elde edilen puanların düşük düzeyde olduğu ortaya çıkmıştır. Grupların ön-test başarı puanlarının düşük olması, çalışma açısından beklenen bir sonuçtur. Zira, çalışmada ele alınan destek ve hareket sistemi konusu, gerek deney grubu gerekse kontrol grubu öğrencilerine uygulamalardan önce müfredata göre işlenmediğinden, her iki gruptaki öğrencilerin bu konuda yeterli bilgiye sahip olmaması doğaldır. Ancak uygulama sonrasında öğrencilerinin başarı testinden elde ettikleri puanlar arasında deney grubu lehine anlamlı farklılıkların ortaya çıktığı görülmektedir. Ayrıca, öğrencilerin başarı testinden elde edilen ortalama kazanç değerlerinin deney grubu lehine oldukça yüksek olduğu görülmektedir. Buna göre, deney grubu öğrencileri üzerinde yürütülen bilgisayar destekli öğretim yönteminin oldukça verimli olduğu söylenebilir. Bir yönüyle bilgisayar desteği ile yürütülen öğrenme sürecinde daha aktif konuma geçen öğrencinin öğrenme sürecinin de olumlu yönde gelişmesi beklenen bir durumdur.

Sonuç ve Öneriler: Sonuç olarak bulgular genel değerlendirildiğinde, yapılandırmacı yaklaşıma dayalı bilgisayar destekli öğretim etkinliklerinin öğrenci tutum ve başarısı üzerinde olumlu etkisinin olduğu söylenebilir.

Anahtar sözcükler: Bilgisayar, fen ve teknoloji dersi, tutum, başarı, ilköğretim.

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