The Effect of Web Assisted Learning with Emotional Intelligence Content on Students' Information about Energy Saving, Attitudes Towards Environment and Emotional Intelligence

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ABSTRACT: For a sustainable world, it is very important for students to develop positive environmental attitudes and to have awareness of energy use. The study aims to investigate the effect of web assisted instruction with emotional intelligence content on 8th grade students' emotional intelligence, attitudes towards environment and energy saving, academic achievement related to the subject, the correlation between students' academic achievement and their emotional intelligence. Totally 60 students (35 female, 25 male) in experimental group and 60 students (37 female and 23 male) in control group were participated in the study. Emotional Intelligence Scale (EIS), Environmental Attitude Scale (EAS) and the Academic Achievement Test (AAT) were administered as a pre-test to experimental and control groups. The application was conducted two hours per week in three weeks time and the research was completed in 6 weeks time. While the experimental group was taught by the software enriched by EI content, the control group was treated with traditional teaching methods in the same subject (Environment and energy saving). Following to the application, EIS, EAS and AAT were administered as post test to the experimental and control groups. The findings of the study reveal that following to the application, there are statistically significant differences in favor of experimental group students' academic achievement, EI and attitudes towards environment.

KEY WORDS: web assisted learning, energy saving, environmental education, emotional intelligence

INTRODUCTION

Currently, through the increasing human population and developing technology, our energy consumption has increased and natural resources are being consumed rapidly as a result of this increase. The most important environmental problems are global warming, extinction of plant

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and animal species, rapidly increasing population, increasing consumption, irresponsible exploitation of natural resources, pollution of air, water and land, and nuclear pollution (Özsoy, 2012). Due to the rapid depletion of natural resources and destruction of the environment, many species have been destroyed and many of them have been faced with the threat of extinction. Through reaching serious levels of environmental problems, taking precautions have become a necessity in different fields. Therefore, to train environmentally sensitive individuals who can find solutions to environmental problems is very important in recent age.

Teksoz, Sahin and Ertepınar (2010) suggest that environmental education is suggested as one of the most effective ways to respond environmental threats. Similarly, Markaki (2014) states the importance of environmental education for reducing environmental problems. According to Bradley, Waliczek and Zajicek (1999), young people's environmental attitudes are particularly important since they will need to provide environmental solutions. Children should be aware of environmental problems and have positive attitudes towards environmental subjects (Özsoy, 2012). Today's youth will be future's adults and they will shape the world and develop future environmental policies (Bradley et al., 1999).

In recent time, one of the most important environmental problems is green house gases arising from the use of fossil fuels and the other is the energy crisis expected to be experienced in the near future due to consumption of these resources. It can be said that current energy resources (coal, oil, natural gas, uranium) are nonrenewable since they will not be regenerated in a short time (Osbaldiston & Schmitz, 2011). Because of limited fossil resources and environmental problems, new options with respect to energy consumption and new resources should be found (Lay, Khoo, Treagust, & Chandrasegaran, 2013). Every citizen in the society should be aware of energy issues in their daily lives. For this reason, until alternative energy resources are actively used, energy conservation has great importance. Therefore, energy conservation has become an urgent problem to solve. For this problem, limiting energy consumption has been thought as a critical solution (Yang, Chien, & Liu, 2012). People should adopt environmentally sound behaviors so they can protect earth's natural resources and prevent further environmental damages (Mainieri, Barnett, Valdero, Unipan, & Oskamp, 1997). From early ages, the instructions related to the subjects of energy conservation and alternative energy sources will enable students to develop of permanent behaviors. There are studies in the literature for this purpose. For example, Osbaldiston and Schmitz (2011) developed an environmental program called "The Energy Challenge" and administered to 9th grade students. They searched for the effectiveness of the program and the results suggested that the Energy Challenge had a positive effect on improving knowledge, motivation, and

behavior of students concerning home energy usage and conservation. Pitic, Moisil, and Dzitac (2013) had similar postive results from their educational web application with a focus on teaching children the value of electrical energy and saving energy.

Environmental and environment-related behavior is closely associated with affective characteristics of individuals. To create environmental awareness, students should empathize with creatures and their habitat. Empathy is associated with the concept of emotional intelligence. In the previous century, intelligence was defined by intelligence quotient (IQ) and perceived as a good predictor of general success both in school and at work, but recently the importance of emotional intelligence (EI) has been understood (Goroshit & Hen, 2012). According to Zayapragassarazan and Kumar (2011) Intelligence Quotient (IQ) is inadequate to evaluate someone, since people are academically brilliant but socially and interpersonally not appropriate. In their study, they mention that only IQ is not enough for professional success of medical professions. Professionals may be competent, but without social skills they are less successful. Goroshit and Hen (2012) mention that EI is a predictor of educational and occupational performance. According to Mayer and Salovey (1995), EI is the capacity to process emotional information accurately and efficiently and EI effects the person's relationship with the other people. Zayapragassarazan and Kumar (2011) describe EI like this "EI describes the ability, capacity, skill, or self-perceived ability to identify, assess, and manage the emotions of one's self, of others, and of groups" (p. 3). As a result of literature research, Behnke and Greenan (2011) summarize EI as one's ability of using learnt information in different situations, coping with different problems and abstract thinking. Behnke and Greenan (2011) explain that EI is a concept which is difficult to measure. But it is worth to measure, since the competencies related to EI will be more important for the changing demands of daily life.

EI can be identified as perceiving emotion in self and others, taking emotions into consideration while thinking and making decisions, understanding emotions of self and others, managing emotions of self and others (Mayer, Salovey, & Caruso, 2000). Therefore, individuals with higher emotional intelligence are more successful in communication with other people. Baltacı and Demir (2012) searched for the correlation between pre-service classroom teachers' emotional intelligence and the ways of their anger expression styles. The results demonstrated that the pre-service classroom school teachers with the skills of emotional intelligence were able to control their anger. The studies display that students' EI affects their academic characteristics. For example, Deniz, Traş and Aydoğan (2009) investigated the effects of EI on the academic procrastination and locus of control tendencies of university students. The

results of the study displayed that emotional intelligence such as adaptability and general mood predicted students' locus and control and there was a negative correlation between emotional intelligence skills and academic procrastination. Buvoltz,Powell, Solan, and Longbotham (2008) searched for the relationship between emotional intelligence and learner autonomy and its' impact on student retention. The results of the study indicated that there was a strong correlation between intelligence and learner autonomy.

As mentioned above, for a sustainable world, it is very important for students to develop positive environmental attitudes and to have awareness of energy usage. Computer technologies develop so fast and they are very attractive for children and teenagers. Pitic, Moisil, and Dzitac (2013) indicate that educational software raise students' motivation and engagement the learning process, since they are fond of computers. Web technologies will increase the effectiveness of teaching. There are some researches in which web based technologies are used for teaching environmental issues. For example, Aivazidis, Lazaridou and Hellden (2005) developed a web-based environmental problem called "The River" and searched for students' and teachers' views related to the subject. By this way, using web technologies for developing understanding related to the environmental subjects will make understanding easier and increase students' attention to the learning subject.

AIM OF THE STUDY

The study aims to investigate the effect of web assisted instruction with EI content on 8th grade students' emotional intelligence, attitudes towards environment and energy saving, academic achievement related to the subject, the correlation between students' academic achievement and their emotional intelligence.

METHODOLOGY OF RESEARCH

Emotional Intelligence Scale (EIS), Environmental Attitude Scale (EAS) and the Academic Achievement Test (AAT) were administered as a pre-test to experimental and control groups. The application was conducted two hours per week in three weeks time. While the experimental group was taught by the software enriched by emotional intelligence (EI) content, the control group was treated with traditional teaching methods in the same subject (Environment and energy saving) . Following to the application, EIS, EAS and AAT were administered as post test to the experimental and control groups.

This study aims to investigate the effect of web assisted teaching software on 8th grade students' attitudes towards environment, emotional intelligence and academic achievement related to environment and energy saving subject. For this purpose, in two different schools in Kahramanmaras, two experimental groups and two control groups were formed by simple random sampling method. In the study, pre-test-post-test control group quasi-experimental research method was used. The experimental group was taught by using www.vitamin.com related to energy issues to help them familiarize themselves with web assisted instruction. This training took a week. Following to this training, the data collection tools were administered as pre test to all experimental and control groups (2nd week), during the next three weeks (3rd, 4th, 5th weeks), the experimental group was taught by web assisted software enriched by EI content related to environment and energy saving subject. During this period, control group was taught by using traditional lecture method in the same subject. Following to the application (6th week), all data collection tools were administered as post test to both experimental and control groups. Pre-application, pretest, posttest, with practice and research continued for six weeks.

Sample

The study conducted in 2 primary schools in Kahramanmaraş/Turkey. In both of the schools, one experimental and one control group were assigned. The groups were assigned by simple random sampling method. Both experimental and control groups consist of 30 students. Totally 60 students (35 female, 25 male) in experimental groups and 60 students (37 female and 23 male) in control groups were participated in the study. Prior to the research, the pilot application was conducted during 2 hours in order to adapt both experimental groups to the teaching method. Following to the pilot application, data collection tools were administered to both groups as pre test. In the content of the study, experimental group was taught by using the software with emotional intelligence content. Control group was taught by traditional lecture method. The experimental and control groups were taught by the same teacher.

Data Collection Tools

Emotional Intelligence Scale (EIS): Bar-On Emotional Quotient Inventory (Child and Adolescent Form) developed by Bar-On and Parker and adapted to Turkish by Köksal (2007) is used to measure students' EI. It is a 4 point likert type scale and consisted of 60 items. Positive statements are scored as 1=Low, 2=Medium, 3=Often and 4=Very Often. Negative statements are scored in reversed code (items 6 and 15). In this study,

short form of this scale which consisted of 15 items is used. The Cronbach Alpha Reliability coefficient of the Turkish Form is 0,912, but it is calculated as 0,745 for this study.

Environmental Attitude Scale (EAS): Environmental Attitude Scale developed by Leeming et al. (1995) and adapted to Turkish by Aslan et al. (2008) is used to determine students' attitudes towards environment. It is a five point likert type scale and consisted of 24 items. The positive statements are scored as 5=completely agree, 4= agree, 3=undecided, 2= disagree, 1=completely disagree. The negative statements (terms 18, 19 and 20) are scored in reverse code. Cronbach's alpha reliability coefficient of the original scale is 0.880 and Cronbach's alpha reliability coefficient of Turkish adaptation of the scale is calculated as 0,86.

Academic Achievement Test (AAT): AAT was prepared by the researchers of this study to evaluate 8 grade students' learning in the subject of environment and energy saving. Content validity of the test was determined through the opinions of 5 experts. AAT consists 10 two-stage questions, 5 true-false questions, 5 multiple-choice questions (totally 20 questions). While scoring two-stage questions, the students get 1 points if they give true answer for the first stage and wrong answer for the second stage, they get 2 points if they give true answers for two stages and 0 points if they give wrong answer for the first step and true answer for the second step. Thus, the highest achievement test score that students get is 30 points. 27 % segments from upper (N=65) and lower groups (N=65) were selected for item difficulty and item discrimination of the test. Item difficulty analysis values of the test is displayed in Table 1.

Table 1. Item Difficulty Index Values of the Test

Item	Item difficulty (p)	Item	Item Difficulty (p)
1	0,70	11	0,24
2	0,68	12	0,60
3	0,80	13	0,71
4	0,48	14	0,72
5	0,71	15	0,79
6	0,69	16	0,52
7	0,66	17	0,48
8	0,69	18	0,50
9	0,64	19	0,55
10	0,57	20	0,68
	TOTAL		0,67

Item difficulty analysis was calculated for each item and it was decided that the obtained values were suitable for an ideal test. For an ideal test, item difficulty index of the items in the test should be between 0,20 and 0,80 and the item difficulty index means of the whole test is expected to be above 0,50. Item difficulty values for the items in the academic achievement test were calculated to change 0,24 to 0,80 and the item difficulty value for the whole test was 0,67. Values display that item difficulty of the test is sufficient.

Table 2. Item Discrimination Index Values of the Test

Item	Item Discrimination (D)	Item	Item Discrimination (D)
1	0,48	11	0,21
2	0,54	12	0,49
3	0,40	13	0,43
4	0,78	14	0,42
5	0,52	15	0,26
6	0,58	16	0,66
7	0,52	17	0,55
8	0,55	18	0,45
9	0,66	19	0,46
10	0,58	20	0,57
	TOTAL		0,51

Table 2 displays that the item discrimination values are over 0,30 (D = 0,51). Accordingly, it was decided that item discrimination of the test was ideal. KR-20 Analysis was implemented for reliability and the value was calculated to be 0,803 for the 20-Item test.

The properties of the instructional software

With the rapid advancement of technology, environmental awareness and energy conservation issues stand in front of the community as important subjects. Due to the human impact on the environment and the rapid depletion of natural resources, students should gain environmental awareness. Therefore, the software used in this research, will appeal to students' emotional intelligence, environmental awareness and aim to increase awareness about energy conservation. The educational software is called as "My environment and energy". A general view of the software is given in Figure 1.

Figure 1. General view of the software

The characters used in the Software are thought to be attractive for students, as the software's background imagery was designed to remind students natural beauty and energy issues. The first section in the software begins with "What do I know?" to determine students' prior knowledge about the environment and energy issues. In this section, there are questions which aim to measure students' awareness of environmental protection and energy-saving. At the beginning of the class, the teacher asks students to answer these questions and students' answers can be seen on teacher panel at the same time, by this way students' misconceptions related to the subject can be determined. Other issues in educational software are called as "Clouds installed with emotions", "A Different World" and "Entertainment". Under these headings, the necessity of sun for a livable environment, soil erosion, the effects of ocean pollution, the effects of greenhouse effect on our lives, the precautions for greenhouse effect, acid rain, desertification, energy resources (oil, gas, coal, nuclear energy), renewable energy sources (solar energy, bio-energy, wind energy, geothermal energy) issues have been processed.

In the software, it is tried to put the issues which appeal to students' emotional intelligence forward. For example, the effects of the illnesses in our body associated with the negative effects on the environment and it is underlined that negative changes make people and living organisms unhappy (Figure 2).

Figure 2. A view of the software

In the software, it is tried to develop the empathy skills of the students and their environmental awareness. For example, environmental pollution is associated with a disease in our body how the many of the organs in our body can be affected by this disease negatively, our environment, the whole of society and nature can be affected as a result degradation or pollution negatively, students are encouraged to establish empathy. Additionally, it is underlined that we share our environment with other people, the environment belongs to all living organisms, if we damage the environment, we give harm to of others and the principle "don't do anything which you do not want done to yourself" has been reminded.

Other parts of the software have been prepared in this format which appeals to students' emotional intelligence. "My environment and energy" educational software is encoded with Microsoft Visual Studio C # 2008. The creation of the forms, buttons and other visual elements used in the program are prepared by using Adobe Photoshop CS4. The animations in the software are created by using Adobe Flash CS4 Professional.

FINDINGS

AAT, EIS and EAS pre-test scores of the experimental and control groups students are displayed in Figure 3.
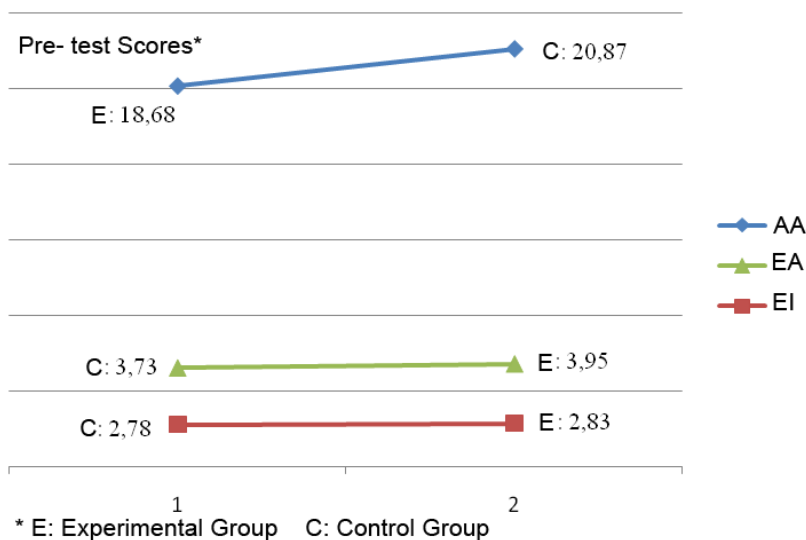
Figure 3. Experimental and control groups pre-test scores

Figure 3 shows a difference between pre-test AAT, EIS, EAS scores of experimental and control group students. Independent samples t-test is conducted to determine if this difference is significant. The results display that there is a statistically significant difference between the AAT scores of the groups [t(118)=2.621; p=0.010<0.05] in favor of the control group, but there is not a statistically significant difference between EIS scores [t(118)=0.697; p=0.487>0.05] and EAS scores [t(118)=1.949; p=0.054>0.05] of the groups. It can be said that the groups have similar characteristics related to EI and EAS. The comparison of the post test results of the groups is given in Figure 4.
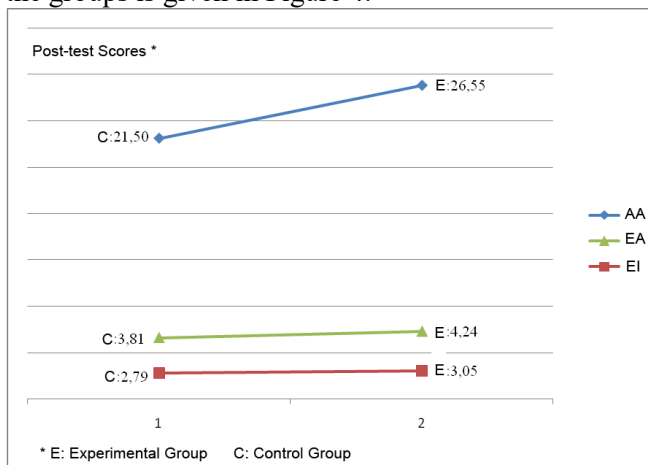

Figure 4. Experimental and control groups post-test scores

Figure 4 shows a difference between post-test AAT, EIS, EAS scores of experimental and control group students. Independent samples t-test is conducted to determine if this difference is significant. The results display that there is a statistically significant difference between the AAT scores of the groups [t(118)=8.118; p=0.000 < 0.01], EAS scores of the groups [t(118)=3.634; p=0.000 <0.01] and EIS scores of the groups [t(118)=3.778; p=0.000 <0.01] in favor of the experimental group. It can be said that the software has positive effects on students' academic achievement related to environment and energy saving, their EI and their attitudes towards environment. Figure 5 displays the comparison of pre and post test AAT,EIS, EAS scores of experimental group students.

Figure 5 shows a difference between pre-test and post-test AAT, EIS, EAS scores of experimental group students. Dependent samples t-test is conducted to determine if this difference is significant. The results display that there is a statistically significant difference between the pre-test and post-test AAT scores [t(59)=-11,787; p=0.000 < 0.01], EI scores [t(59)=3.282; p=0.002 < 0.01] and EAS scores [t(59)=2.939; p=0.005 < 0.01] in favor of the post test. ANCOVA analysis is conducted to determine if there is a difference between post test results when pre test scores are controlled and the findings are displayed in Table 3.
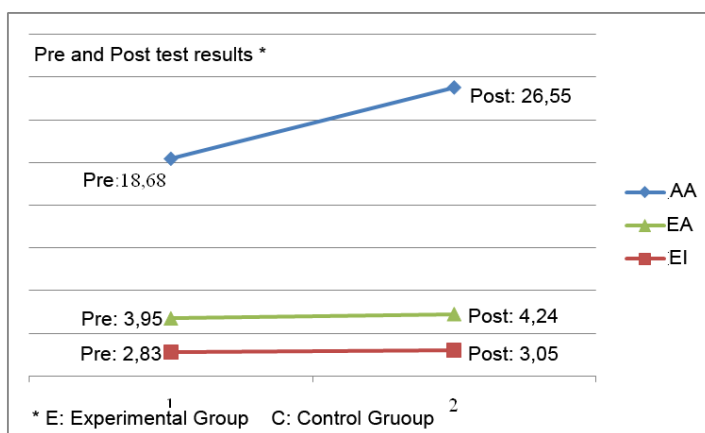

Figure 5. Comparison of experimental group's pre-test and post-test scores

Table 3. ANCOVA Analysis Results When Pre-Test Results Are Controlled[*]

Source of Data	Type III Sum of Squares	df	Mean Square	F	P
Model	940.276*	4	235.069	22.628	0.000
Group	549.485	1	549.485	52.895	0.000
Error	1194.649	115	10.388		
Total	71399.000	120			
Corrected Total	2134.925	119			

$R^2 = 0.440$

According to Table3 , the model implemented in ANCOVA Analysis is meaningful ($p = 0,000$ for the model) and the model explains 44 % of the conceptual achievement ($R^2 = 0.440$) in environment and energy saving subject. Table 3 displays that the implemented software has meaningful effect on experimental group students' academic achievement when pre-test scores of groups were controlled (F = 52.895; p < 0.01).

In the study, multiple linear regression analysis is conducted to determine the relationship between experimental group students EI, EAS, gender and school variables. The results of regression analysis are displayed in Table 4.

Table 4. Regression Analysis

Variable	B	Std. Error	Beta	t	p	Zero-order r	Partial r
Constant	18.304	3.393	-	5.394	0.000	-	-
EI	-0.198	0.974	-0.025	-0.203	0.840	0.046	-0.270
EAS	1.000	0.683	0.191	1.464	0.149	0.346	0.194
Gender	0.662	0.717	0.110	0.924	0.360	0.140	0.124
School	2.451	0.749	0.414	3.274	0.002	0.502	0.404

When the bilateral and partial correlations are examined, there is a linear, positive and moderate correlation (r = 0.502) between school and academic achievement, again a linear and positive correlation (r = 0.404) has been identified when other variables are controlled.

EAS, EI and school variables are moderately correlated with experimental group students' academic achievement scores (R = 0.537, R^2 = 0.288, p <0.01). EAS, EI and school variables explain 29% of success in the experimental group.

According to the standardized regression coefficients (Beta), the importance range of the variables on academic achievement is school, EAS, gender and EI. When t-test results regarding the significance of regression coefficients are analyzed, it is identified that school variable

has a significant effect on academic achievement. In contrast, EI, EAS and gender variables do not have any significant effect on academic achievement.

RESULTS AND DISCUSSION

The findings of the study reveal that following to the application, there is a statistical significant difference in favor of experimental groups students' academic achievement, EI and attitudes towards environment. In this case, it can be stated that the software has effected experimental group students positively. The findings of the study reveal that following to the application, there is a statistical significant difference in favor of experimental groups students' academic achievement, EI and attitudes towards environment. Nowadays, computer technology is widely used in all areas of our lives. Especially children and young people spend a substantial period of time every day by using this technology. When this technology is used for educational purposes (when it is the issue of students' utilization of this technology for educational purposes other than their daily preferences), it helps to increase students' achievement related to the subject and develop their emotional intelligence and attitudes towards environment. Similarly, Yang, Chien and Liu (2012) developed an Energy Conservation PET (ECOPET) system using a game-based learning strategy. In this system, the students are encouraged to use energy conservatively by playing. The results of the study reveal that the system promotes students' learners' self-awareness, learning motivation, and willingness to conserve energy. Similarly, Papastergiou, Antoniou and Apostolou (2011) in their study create Online Learning Community (OLC) for the implementation of an environmental education project. The study revealed that the OLC had positive effects on students' knowledge and attitudes towards the natural environment. Ruchter, Klar and Werner (2010) in their study reveal that the computer as mobile guide can lead to an increase in environmental knowledge and it can increase children's to engage in environmental education activities. Kunduz and Seçken (2013) developed a multimedia material which involved animations, virtual lab and educational computer applications and applied this material to the students. The study revealed that the software had positive effects on student achievement.

According to Chen and Sun (2012), traditional learning materials such as static texts are being transformed to multimedia materials to control learner attention and interest. As it could be conceived from the literature review that web assisted applications help to promote students academic learning and develop positive attitudes towards learning the subject. The source of positive effects of web-based applications on students' learning

is students' positive attitudes towards these materials. Additionally, web-based applications are quite remarkable with their visual and auditory characteristics. The videos and animations in multimedia materials also appeal to students' different senses and they enhance students' learning. For example, Lou, Lin, Shih, and Tseng (2012) aim to explore the effects the multimedia teaching materials on the achievements and attitudes of junior high school students in a chemistry laboratory context. The findings of the study indicate that the video and animation have significant effects on promoting students' learning in the chemistry laboratory. Another feature of Web-assisted applications, they give the opportunity for students to learn based on their own learning speed. This feature has positive contribution on students' learning. In addition to individual learning speed, mentioned application offer unlimited repetition and this increases students' learning.

The findings of the study reveal that following to the application emotional intelligence of the students in the experimental group has increased. Emotional intelligence is very important for individuals to be able to establish healthy relationships with others and to empathize. Individuals with higher emotional intelligence have ability to empathize with other living organisms and therefore, they are more sensitive to the environment. Thus, it is important to develop children's empathy skills. Studies in the literature have displayed that emotional intelligence can be developed by using some teaching strategies. For example Goroshit and Hen (2012) in their study examined the effects of a course on the EI of undergraduates. The findings of the study reveal that EI can be improved by using specific teaching strategies in higher education.

In conclusion, in this study the effect of traditional lecture method and multimedia learning material usage on students learning related to environment and energy saving issues, their emotional intelligence and attitudes towards environment have been investigated. Currently, giving information in packets and learning environments where students sit passively/ do not participate are not preferred. In passive learning environments, traditional lectures and written texts do not attract students' interest. However, in parallel with the development of technology, multimedia materials with rich content which appeal to many sensory organs at the same time enhance learning and effect some emotional components like attitudes positively. Today, energy usage is one of the most important environmental problems. Until alternative and clean energy sources is widespreadly used, energy saving should be thought as a solution. Therefore, it is very important to develop children's information and awareness related to the subject.

SUGGESTIONS

Learning materials should be developed related to the issues which have great importance in daily life, and these materials should engage students' interest. While developing environmental awareness among students, empathy skills should be developed. Therefore, activities should be designed for students' emotional intelligence. In the solution of environmental problems, students need to develop positive attitudes towards the environment. However, the development of attitudes in teaching process will not occur in a short time, so learning activities should be designed considering this case.

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