

Full Length Research Paper

The effects of the activities of current textbook and 5 E model on the attitude of the students: Sample of “the global effects of natural resources unit”

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This study aimed to determine the effects of the activities of current textbook and 5 E Model on the attitude of the students. This study is a research as an experimental model. For testing the effects of geography education supported by 5 E model and geography education based on activities of current textbook attitude of students, controlled pre-test and post-test is used. Process had gone on eight weeks. “Attitude test is developed to examine the level of student attitude after and before the application. In order to analyze the data, arithmetic mean, standard deviation, t test were used. As a result of the research, it is observed that 5 E Model is effective on students’ attitude, but geography education based on activities of current textbook is not effective on students’ attitude; while teaching “the global effects of natural resources unit” in geography ninth lesson. Next researchs can be done to aim at test this situation. Beside, secondary geography text book can be prepared to based on 5 E model.

Key words: Textbook, activity, 5 E model, attitude, geography lesson.

INTRODUCTION

Nowadays, there is a rapid change at global level. The countries being able to keep pace with this rapid change are the probable headliners of the world. Whether the change is rapid or slow, the communities can only catch up with the change through education. In the knowledge and technology era where the traditional educational approaches are insufficient and unhappy individuals are grown up, today’s society, in which science and technology are speedily changing, the information is multiplying quickly, and the problems are appearing in a complex structure, needs a constructivist approach for the individuals who analyze and synthesize new information instead of using the memorized one; who use this synthesis in the solution of problems of complex structures; who can catch sight of the relationship among science, technology, society and the environment (Bayrakçeken and Yalçın, 2010).

In the constructivist learning theory, a continual exploration and the development of the mental structures are subject matters. For this reason, the learner needs to

study the samples, bring forward proposals, test the ideas, solve the problems, transform the ideals into other formats (picture, graphics, maps, and etc.) (Herne, 2000). According to Bodner (1990), one of the leading advocates of constructivist model, the knowledge is constructed in the mind of learner, and the chance for the knowledge to be transferred from teacher to the students without any change is quite low. The constructivist approach and the studies carried out in parallel to it, focused on how to secure the permanence of the knowledge rather than obtaining it and how derive new information from the acquired knowledge (Shiland, 1999). With this innovation and the reconstruction, it is aimed to raise the individuals who ponder, question, investigate, approaches the events scientifically, render the information they obtained, and create new information and attitudes starting out from the acquired information. Different from the traditional understanding, in the constructivist approach, not the teacher but the students and their process of learning are focused on. The approach

aims at creating the individuals who provide the knowledge by their experiences and efforts, and reach new information based on their present knowledge rather than letting them access readily presented information (Perkins, 1999). The real information cannot be composed independent of the individual's life. The real information is accepted in the constructivist approach; however, this information consists of the events from life and the relations between these events (Von, 1995). The teacher is only a guide in this approach. The teacher is not the direct supplier of the information as in the traditional approach, but the facilitator for the students to reach information. In other words, it is not the teacher but the student who is active in teaching and learning process.

The learning cycle designated in three steps based on the constructivism, was detailed as four-step model, 5 E model and 7E model as a result of some studies. 5 E model is one of the most practical recommended models, in the application of constructivist learning theory (Özmen, 2004). Being widely used the structuralist approach, the 5 E model consists of the activities that increase the students' curiosity to research, respond to their expectations related to the subject and include the active use of their knowledge and skills (Ergin et al., 2006). 5 E model encourages the students to formulate their own concepts by involving them in activities at all stages (Martin, 2000). The 5 E model's name represents all the stages and their numbers (Bybee, 1997). This learning model applied in five stages and named as "5 E Model" is composed of 5 stages: engagement, exploration, explanation, elaboration and evaluation (Appendix) (Tinker, 1997; Carin and Bass, 2005; Lorschbach, 2006). The roles of students and teacher in 5 E model are as follows:

Engagement

It is the entry stage of the model. The motivation of the students is promoted and their interest for the subject is stimulated. Teachers, at this stage, pose questions, define a problem or demonstrate an event related to the subject and facilitate the students to comment on the subject so that they can identify the students' preliminary knowledge (Bybee, 1997; Wilder and Shuttleworth, 2005).

Exploration

At this stage, the students actively generate ideas for the solution of the questions and attempt to find ways of solution. The teacher is the supplier of the materials and the guide to control their attention (Carin and Bass, 2000;

Newby, 2004).

Explanation

The teacher helps the students to compensate missing information or exchange their misinformation with the new one. The teacher utilizes more striking techniques such as oral explanation, movie, video and demonstration (Campbell 2000; Bybee et al., 2002).

Elaboration

This is the stage where the students adapt and implement the new information they acquired to new situations. The teacher provide the students to use their information in different situations, and have responsibility (Morse et al., 2004).

Evaluation

This is the last stage of the model in which the students change their behaviour and evaluate their progress. The information obtained from the evaluation guides the teacher in his planning for the next course. Besides the alternative assessment and evaluation approaches such as checklists, structured grid, diagnostic tree, concept maps, structured teacher observation charts, student interviews, personal development portfolios and project and performance homeworks, the classical evaluation approaches can be utilized (Bybee et al., 2002).

The studies having been conducted show that 5 E learning cycle model promote the attitudes of the students of different disciplines, provide their conceptual development, and alter their attitudes in a positive way (Lord, 1999; McCormick, 2000; Stamp and O'Brien, 2005; Garcia, 2005; Öztürk, 2008). The attitude is a phenomenon which is acquired through learning, guides the behaviours of the individual, and a cause of bias in the process of decision making (Ülgen, 1997). Attitudes are related to coping with and controlling the emotions appearing during learning, and are of great role in guiding human behaviours. Whether positive or negative, the attitudes established based on a system of value or belief affect the learning process directly and lead the the individuals' lives (Ergin et al., 2006). In the National Education Basic Law (no 1739), the overall goal of national education is to grow up happy people. Happy people can only be embodied through reaching; in other words, achieving the goals. It is argued that the students develop attitudes toward geography course at the first stage of primary education (Demirkaya and Arıbas, 2004). Colley and Comber (2003), on the other hand,

ascertain that the students of 11 to 16 ages show a positive attitude toward geography course. One important stage in raising the individuals with positive attitudes toward geography and related issues is to educate the individuals in accordance with their predetermined attitudes.

The Ministry of National Education designated a geography curricula based on the constructivist approach, and this curricula was started to be conducted at all schools at the country-wide level as of 2005 to 2006 academic year without any pilot study. Nevertheless, the coursebooks having been prepared according to the constructivist approach have been used without any modification despite the past five academic years. According to a variety of studies conducted worldwide, the coursebooks are still the main course material. In the USA, the coursebooks cover 70 to 95% of course duration (Shannon, 1992). However, in Turkey the coursebooks are the mostly used materials with the proportion of 72% according to a research executed in 7 provinces (Kılıç and Seven, 2002). According to the other research results, a majority of the students regarded coursebooks as the source of all information and perceived the coursebooks as a tool through which all sciences can be experienced; moreover, the parents put the coursebooks in the core of education and unless it is utilized in homework, they will severely reacted to this situation (Soong and Yager, 1993). Although the teachers and students see the coursebooks as the indispensable part of education, the geography teachers reflected negative opinions of the current coursebooks in relation to the gains-content, educational status, test status, scientific content, design, language and expression. Furthermore, the teachers stated that the coursebooks were insufficient in terms of education, and was not qualified enough to make the students like the course (Solmaz et al., 2010). In the light of the information provided from literature, it is thought that the views of students of the 11th grade geography coursebook may contribute to the improvement of coursebooks. Starting from this point of view, the difference between the attitude points the group being subject to the current coursebooks activities and the group experiencing the activities designed according to 5 E model in teaching the unit of “the global effects of natural resources” in the learning domain of “environment and society” included in 11th grades geography course were examined. In line with this purpose, the answers for the following questions were sought in the study.

- (1) Is there a considerable difference between the means of control group's pretest and post test attitude points?
- (2) Is there a considerable difference between the means of experimental group's pretest and post test attitude points?

- (3) Is there an expressive difference between the means of post test attitude points of experimental and control group?

METHOD

This is a semi-experimental study. A controlled pretest and post test pattern was used to test the effects of the current coursebook activities and 5 E model-oriented activities on students' attitudes toward the gains of the unit named “The global effects of natural resources” included in 11th grades geography course. Since the effects of the variables in the control and experimental groups are the same, the biases or the effects caused by the resources such as date, maturity, testing and tool that can threaten the internal validity are fairly manageable (Kaptan, 1998). The symbolic view of the experimental pattern is as in the Table 1.

Universe and the sample

The study was carried out on 11th grade students at an Anatolian High School in Izmir Province during 2010/2011 akademik year. In other words, the population of the research consisted of the 11th grades at Anatolian High Schools in Izmir Province. The sample was chosen randomly among five 11th grades. There were 60 students at the two 11th grade classes. 30 (50%) of the students are male while 30 (50%) of them are female in Table 2.

The means of pretest points for the control group subjected to the activities covered by current coursebook and the experimental group to which 5 E model was applied in teaching the “Global effect of natural resources” are shown below.

The pretest attitude points for experimental and control groups are presented in Table 3. The mean of pretest points for experimental group is 77.6333, while it is 82.7667 for the control group. The t test assessed the means of pretests as 0.925, olarak hesaplanmıştır. This value is meaningless at 0.05 level. One can say that there is not any difference between experiment and control groups which means the groups are equal.

Data gathering tools

Attitude scale for geography course

The attitude scale for geography course which determines the secondary education students' attitudes towards geography course was developed by Uzunöz (2010). Firstly, 400 students at secondary education were made write a composition on “the importance of geography course and its place in your life”. The compositions were examined and a form with 125 items was composed as the preliminary draft. This form was presented to 5 instructors to secure content, face, criterion and construct validity. Following the expert opinion, necessary revisions were done and a draft scale composed of 44 items emerged in different sizes. The draft scale was tested upon 362 students taking geography course at four secondary schools. Item-total correlation values of the items in the scale were changing from 0.37 to 0.67. The mean of scale is observed to be (60.1519) < median (61) < mode (67) in Table 4. It shows that the distribution is negatively skewed (left skewed) and has the average difficulty. If the kurtosis value is (-0.401) negative, it means there is more uniform distribution than the normal, and if it is 26 and above, it show that there is heterogeneous distribution (Tekin, 1993).

Table 1. Test pattern used in the study.

Groups		Pre test	Denel process	Post test
Experiment	E1	AS for GC	5E Model-based teaching	AS for GC
Control	C1	AS for GC	Activities of current textbook	AS for GC

Table 2. Information about subjects.

Classes	Sex				Total
	Girl		Boy		
	N	%	N	%	
9/A	12	20	18	30	30
9/B	18	30	12	20	30
Total	30	50	30	50	60

Table 3. Attitude test experimental and control groups at pre-test scores mean, standard deviation and t value.

Groups	N	\bar{X}	Ss	T	P
Control	30	82.7667	29.17094	0.925	0.359*
Experimental	30	77.6333	8.55604		

P> 0.01.

Table 4. Descriptive statistics for AS for GC.

N	362
Mean	60.1519
Median	61.0000
Mod	67.00
Standard deviation	19.13856
Variance	366.284
Skewness	0.131
Kurtosis	-0.401

According to the factor analysis results, the scale has six factor structure. The first factor explains 34.992%, second factor 7.295%, third factor 5.912%, fourth factor 5.764%, fifth factor 5.226%, sixth factor 5.038% of the variance which makes 64.226% in total. In the calculation of the reliability, the suitability of the model was calculated as $p \leq 0.000$ by hotelling t^2 test. According to Özdamar (2004), if $p \leq 0.001$, null hypothesis is rejected. The result indicates the rejection of the null hypothesis and the existence of a high correlation between the variables. According to the results of reliability test applied to the remaining items in the draft scale, Cronbach Alfa value of the scale comped of 24 items was calculated as 0.912. Based on the date existing data, one can say the attitude test carries the characteristics to be used for the unit of "The global effects of natural resources".

The attitude scale was calculated based on 120 full points. The attitude scale was tested on the students both as pretest and post test. It was first applied to determine whether there was a difference between the experimental and control groups before the operation. It was secondly employed to test expressiveness between the

pretest and post test points after the operation. The data obtained from the operations were graded for positive statements as "strongly agree" five points, "agree" 4 points, "undecided" 3 points, "disagree" 2 points, "strongly disagree" 1 point; and for the negative statements it was graded vice versa, and the results were inputed to SPSS 15.0 for windows software. An independent t test was used for this data, and means, the standard deviation values and t values were calculated for the points provided for experiemntal and control groups.

Operations

Here are the pre-operations and post operations employed throughout the research:

(1) The school was visited, and after the necessary information about the physical and technological conditions and the students was gathered, the experimental and the control groups were determined.

(2) A seminar about 5 E model was held for the experimental group before the operation. The knowledge of students about 5 E model was examined, and their deficient knowledge was compensated. The control group was not mentioned about 5 E model.

(3) The classroom and course rules were designated by the students through brainstorming, and they were approved by considering their compliance to the regulation for secondary education. Hence a confident start to the course was secured. Firstly unit of "The global effects of natural resources" supported by the 5 E model' activities was studied with the experimental group, and the student were made ready for the operation. With the control group, on the other hand, the activities of the coursebook being designed in accordance with current curricula were implemented.

(4) After the pre-study was completed, an attitude test prepared by the researcher was applied in order to determine the pre-operation attitudes of the students in the control and experimental group. These operations were executed by the researcher himself, and the acquired data was inputted to the statistics software.

(5) The operation lasted for 8 weeks. The plan was stucked to, and the courses were done with the control and experimental groups for 8 weeks. During the operation, the experimental group students seemed to be attentive to the course, while the students in the control group were losing their curiosity about the course.

(6) Following the completion of the operation, the attitude scale was applied to the students in the experimental and control groups once more, and the attitudes of the students after the operation were identified.

RESULTS

The first sub-problem and the interpretation

The first sub-problem of the research was stated as "Is there a considerable difference between the means of control group's pretest and post test attitude points?" In order to test this problem, a t test was implemented; the means and standard deviations for the difference between the attitude points of pretest-posttest of the control group were calculated.

The pretest-posttest attitude values for the control group are shown in Table 5. As shown in the table, the mean of pretest attitude points of the control group is 82.7667, while that of post test is 66.5667. The t value obtained from the t test applied on the means of pretest and post test attitude points was calculated as 2.975. This value is meaningful at 0.01 level. Therefore, one can say that the students' attitudes decreased in the course of the geography education supported by the activities of the current textbook.

The second sub-problem and the interpretation

The second sub-problem of the research was "Is there a considerable difference between the means of experimental group's pretest and post test attitude points?"

To test this problem, t test was applied; the means and standard deviations for the difference between the attitude points of pretest-posttest of the experimental group were calculated.

The pretest-posttest attitude values for the experimental group are shown in Table 6. According to the table, the mean of post test attitude point of the control group is 94.2667, while the mean of pretest attitude points is calculated as 77.6333. As a result of t test applied to determine the difference between the two groups, t value was observed to be 4.301 which shows that there was meaningful difference between the post and pretest points of the experimental group. It can be said that there was a development in the attitudes of the students after 8 weeks of geography education supported by 5 E model.

The third sub-problem and the interpretation

The third sub-problem of the research was stated as "Is there an expressive difference between the means of post test attitude points of experimental and control group?" To test this problem, t test was applied; the means and the standard deviations for the difference between the attitude points of post test of the experimental and control groups were calculated.

The post test attitude values for the control and experimental groups are presented in Table 7. As shown in the table, the mean of post test attitude values of the experimental group is 94.2667, while that of the control group is 66.5667, and t value was calculated as 7.456. Accordingly, there is a meaningful difference between the means of post test attitudes values of experimental and control groups at $p < 0.01$ level after the operation. It means that compared to the geography education based on the activities of current coursebook, the geography education based on the activities of 5 E model developed the attitudes of the students toward geography course.

DISCUSSION

The effectuality of the activities in current coursebook designated in accordance with the constructivist-based geography curricula and the activities complying with 5 E model on the attitudes of students towards the gains of "the global effects of natural resources" was investigated through this study. While the activities of coursebook designed according to current geography curricula caused a statistically meaningful decrease in the attitudes of the students toward the course in Table 5), the activities in accordance with 5 E model led a statistically meaningful improvement in the attitudes of the students Table 6. When the literature is studied, one can see that

Table 5. Attitude test and control groups at pre-test scores mean, standard deviation and t value.

Group	N	\bar{X}	Sd	T	P
Control	30	82.7667	29.17094	2.975	0.004*
	30	66.5667	6.22389		

P < 0.01.

Table 6. Attitude test and experimental groups at pre-test scores mean, standard deviation and t value.

Groups	N	\bar{X}	Sd	T	P
Experimental	30	77.6333	8.55604	4.301	0.000*
	30	94.2667	19.37459		

P < 0.01.

Table 7. Attitude test and experimental and control groups at post-test scores mean, standard deviation and t value.

Group	N	\bar{X}	Sd	T	P
Experimental	30	94.2667	19.37459	7.456	0.000
Control	30	66.5667	6.22389		

P < 0.01.

in a similar study conducted by Öztürk (2008), there was not any difference in the attitudes of control group, while a significant difference occurred in the attitudes of the experimental group after the operation. The decrease in the attitudes of the students in control group can be attributed to the current coursebook's gains-content, educational status, test status, scientific content, design, language, expression and insufficiency for teaching which accordingly causes students to take a dislike to the course (Solmaz et al., 2010). In this context, the enthusiasm, motivation and the willingness that the students own gives way to monotony in the course of time. The students of experimental group fulfilled the activities eagerly. It was observed that the visual materials, equipment and group works promoted students' desire and their interest toward the course. On the other hand, at the end of operation process, compared to the activities of current coursebook, the activities designed in accordance with 5 E model statistically became more effective on the the students' attitudes toward geography course (Table 7). When the literature is analyzed, this result is confirmed by the results of the studies carried out by Lord (1999), McCormick (2000), Stamp and O'Brien (2005), Garcia

(2005) and Öztürk (2008). The development in the attitudes of the experimental group students can be associated with being able to relate the activities to daily life, students' working in cooperation and taking more responsibility. It is possible to say, at the evaluation stage, the use of alternative evaluation techniques such as structured grid, concept maps, diagnostic tree, portfolios and performance homeworks raised the students' interest and contributed the development of their attitudes.

SUGGESTIONS

In the light of research results and discussions, the following suggestions can be made:

- i) The activities prepared according to 5 E model for the gains of "the global effects of natural resources" can be designated for other units, as well, and their efficacy in terms of attitudes can be researched.
- ii) The activities in the geography coursebook can be reviewed, and the activities can be revised according 5 E model.

- iii) A course on building activities according 5 E model for teachers can be organized in the framework of university-school cooperation.
- iv) The Ministry of National Education can set a competition for either national or international bodies for publication of coursebooks.
- v) The books of those who placed on the top of competition can be chosen by a semi-official commission.

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Appendix. Lesson plan 1.

Part-I	
Course	Geography
Class	11
Unit	The global effects of natural resources
Subject	The global environmental problems
Recommended duration	2 course hours
Part-II	
Student gains	D.11.15 The strategies to protect environmental problems are developed.
Key words	Environmental problems, ozone depletion, greenhouse effect, global warming
Teaching-learning methods and techniques	5 E Integrative teaching strategy, group work, brainstorming, question-answer, role play, worksheet,, ozone cartoon
Educational technologies used: instruments and source	Course book, environmental education activities for primary schools (UNEP), projection, computer.
* Teacher	
* Student	
Learning-teaching activities	
Engagement	The ozone cartoons are distributed to the students, and the students are requested to examine the cartoon for a while to notice the environmental problem in the cartoon and think over it. Then their attention is raised through the following questions: "why do we use sun block?", "Is there anybody who knows why we wear sunglasses?", "Well... Why do we wear hat when it is sunny?" In this way, the students are made feel that there are harmful sun rays as well as the beneficial ones. The fact that these harmful rays constitute only very limited part of the rays reaching to the earth evokes the question "what is it that prevent these rays to reach us and protect us?" a question which attracts attention to the existence of the ozone layer.
Exploration	What if there weren't a structure protecting us? With this question, brainstorming is started. The answers are written on the board one by one. Then the "ozone holes" play which is given to the students in the previous is performed. Following the performance all the students are asked to tell what they feel about the ozone layer. Consequently, the students are made to notice the function and importance of ozone layer.
Explanation	In order to respond the question in the students' minds, necessary explanations are made together with an ozone layer themed presentation in computer environment supported by visuals. Meanwhile, the students are encouraged to ask questions and take notes.
Elaboration	At this stage, the worksheets named "bad news from ozone layer" are distributed and their attention is drawn to the question of entrance part. Later the students are expected to write their letters included in the elaboration part on their worksheets.
Evaluation	After the puzzle and the diagnostic tree are completed by the students in order to maintain and evaluate their learning in an entertaining way. After that the students are given homework to design a poster and make a slogan concerning ozone depletion.
Part-III	
Remarks regarding the implementation of the plan	

Teacher

.../.../...
Principal