



The Effect of Six Thinking Hats on Student Success in Teaching Subjects Related to Sustainable Development in Geography Classes

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Abstract

This study aimed to assess the effectiveness of six thinking hats technique in teaching subjects related to sustainable development in geography classes. The study was in both a quantitative and qualitative form. The quantitative part of the study was designed according to pre-test, post-test control group research model, and in the qualitative part, answers given by students to interview questions were analyzed according to descriptive analysis method. The population of the study consisted of 650 students studying in Gaziantep Araban High School and the sample consisted of 36 students studying at 11th grade in the same school. The results of the study revealed that teaching techniques based on six thinking hats resulted in more positive results compared to other teaching techniques proposed in the curriculum.

Key Words

Geography Teaching, Sustainable Development, Six Thinking Hats Technique.

Environmental pollution that has emerged in local level in industrial cities first and then in regional, national and international level depending on factors such as rapid population increase, rapid urbanization and use of natural resources excessively and intensively as a result of advances in technology has become a threatening risk for next generations. The balance tried to be created between economy, society and environment after 1970s brought environment education and sustainable development concepts to forefront (Evin, 2005; Keleş & Hamamcı, 2005). The first comprehensive approach in international level about *sustainable development* was adopted in "United Nations Environment and Development Conference" held in Rio de Janeiro in 1992. An agenda named Agenda 21 (21st century Agenda) was specified, in which interactions with environment were discussed (Güçlü, 2007, p. 2-3).

Sustainable development necessitates individuals to think globally and act locally. Individuals can acquire these skills with education organized for this purpose (Stengel, Liedtke, Baedeker, & Welfens; 2008). Parke (2010) and McKeown (2002) stated that, teaching individuals skills of acting in global sense of responsibility, being able to adapt to change, communicating effectively, proposing alternative solutions to problems, thinking critically and creatively is of great importance for a sustainable future.

Since factors such as increase in roles of international partners, the desire to possess energy sources, countries' efforts to make use of sources more effectively and removal of the negative effects of globalization require geography knowledge and point of view, geography teaching is becoming more and more important (İncekara, 2009), because geography is a science that is in connection with interdisciplines and disciplines,

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requires cooperation, use of multi-media and critical thinking, is contemporary enriched with implementation and method, is related to behavior change and has value education (Heinecke, 2009, p. 29). Human, environment and economy that are the main components of education are key for sustainable development and the basis of geography is to assess relationships and interactions of these components (Alkış, 2009, p. 46). By teaching social, economic and environmental changes through geography education, living in harmony with nature can be ensured (Demirci, 2006). Sustainable development education has become an integral part of geography education in many countries (Alkış & Öztürk, 2007). Luzern declaration (2007) pointed out to the importance of having knowledge and understanding, skills, attitudes and values for sustainable development. Despite similarities, geography education is carried out in different classroom environments and by following different teaching methods in the world (Taş, 2007). Because of changing perceptions in education, students are now not only learning knowledge, but also producing it through multi-directional, abstract, critical and independent thinking (Özden, 2005). By ensuring students to do independent research and experiment and to produce original alternatives, teacher must guide students during the process of revealing and improving their creativity (Tuckman, 1992).

Creative thinking is a significant skill for adapting to changing world and every individual has varying levels of creativity (Runco, 1996). We can summarize some recent research conducted on this subject as such: Demirci (2007) studied the effect of creativity approach in science teaching on attainment and attitude; Karapınarlı (2007), the effect of teaching 7th grade math class "Ratio and Percentage Calculations" unit via creative drama on student success and permanency of learning; Güngör (2006), the effect of use of creative thinking techniques in geography class on student success; Can (2005), the effect of use of six thinking hats technique on student success in social sciences class; Aksoy (2005), the effect of creative thinking-based scientific method process on learning products in science classes; Nakiboğlu and Altuparmak (2003), the effect of brainstorming, one of the creative thinking techniques, on students' interest in class and scientific thinking process; Korkmaz (2002), the effect of project-based learning in science class on thinking-problem solving-academic risk taking levels and Çetingöz (2002), the creative thinking skills of teacher candidates studying in pre-school education department.

Demirel (2008) notes that six thinking hats tech-

nique is important for developing creative thinking skills. Six thinking hats technique was developed by Edward De BONO in the beginning of 1980s. Six thinking hats technique promote articulation of different opinions and thinking differently in different situations. Student, through this technique, find solutions out of deductions from their own experiences, define and analyze their feelings and evaluate others' feelings by being emphatic (Tok, 2010, p. 189). This creative thinking technique is based on using six different thinking aspects which are objectivity, organization, subjective feelings, creativity, positive and negative sides (Shawel & Billing, 2011). Hats are known by their colors not by their functions in six thinking hats technique but, teacher must make sure that students can play the role identified by each color (Bono, 1997).

Features of each color are as follows (Animasahun, 2007; Bayerl, 2005; Bono, 1997; Kohlöffel & Rosche, 2009; Küçükahmet, 2003; Tok, 2010): *White hat* is impartial and objective. *Red hat* recalls anger, passion and emotion. *Black hat* is negative and pessimistic. *Yellow hat* is related to being happy and positive thinking. *Green hat* is related to creativity and new ideas. *Blue hat* deals with organization and control of thinking process and ensures discipline. In six thinking hats technique, white, black, yellow, green and blue colored hats are given turns to speak respectively (Wetterer, 2005).

This study aimed to "assess the effectiveness of six thinking hats technique on students' success in teaching subjects related to sustainable development in geography classes" by answering the question: "In teaching subjects related to sustainable development in secondary school level geography classes, is there a significant difference between success of students who are in experiment group taught by learning activities prepared in accordance with six thinking hats technique and success of students in control group who are taught by activities proposed in the normal curriculum?" To achieve this general aim, the following sub aims are to be achieved:

1. To assess the effects of six thinking hats technique and teaching activities proposed in the curriculum,
2. To assess students' opinions regarding the application of six thinking hats technique.

Method

Research Model

The study that aimed to assess the effect of six thinking hats technique (independent variable) on

academic success (dependent variable) has two dimensions: quantitative and qualitative.

In the qualitative dimension of the study, responses given to questions by students were analyzed according to descriptive and content analysis method. Descriptive studies describe a given situation in detail (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2009, p. 21). Experimental research design was used in the quantitative dimension of the study. Adding two groups, experiment and control groups, in experiment research is a method of comparing results gathered after experiment group was intervened is compared with findings gathered from the other control group (Ekiz, 2009, p. 109). The study is designed as pre-test and post-test control group research model in line with experimental research (Karasar, 2007, p. 97).

In the qualitative dimension of the study, responses given to questions by students were analyzed according to descriptive and content analysis method. The researcher carried out teaching of subjects in application process. The experimental study took 32 hours in 8 week-time between February 21 and April 15 2011.

Study Group

Population of the study consisted of 650 9th, 10th, 11th and 12th grade students studying in Gaziantep Araban High School. It was specified that the most acquirements related to sustainable development teaching were in 11th grade "Environment and Society" learning domain; thus, it was conducted in 11th grade related learning domain.

While creating experiment and control groups, in order to ensure impartiality, during the grouping procedure of the 11th grade students ($f=51$) who were studying in "Social Sciences Division", their general point averages (GPA), success scores in geography class and scores gathered in the pre-test were considered according to clustering analysis technique. Based on clustering analysis technique, two groups were created and total 42 students were added to the sample. 6 students who did not take pre-test were not included in the sample and thus, the study was carried out with 36 students. 11 SOS A class was taken as experiment and 11 SOS B class was taken as control group.

Data Collection Tools

Success test and interview questions were used to measure students' success in this study.

Success Test: Acquirements specified related to

"Environment and Society" learning domain were created in table of specifications. After a test form consisting of 42 multiple choice questions with at least 3 questions from each acquirement was created, opinions of two geography teachers and two education experts were gathered in order to assess the questions' suitability for assessment and evaluation criteria and for the content and face validity of the questions. The test form edited to have 35 questions based on the suggestions was given to 100 12th grade students who took Geography class in Araban High School previously as pre-application test and factor loadings, item difficulty and item discrimination index of each item were analyzed. 25 items item difficulty of which ranged between .33 and .82 were used in success test and other items were removed from the test. KR-21 coefficient of the test was found to be .80. Thus, the success test can be considered to be reliable.

Interview Questions: After the teaching-learning process carried out in the study; students' opinions related to teaching-learning process in which six thinking hats technique was used were collected. To achieve this, four questions included in the interview form were decreased to two based on expert opinions. The questions can be seen below:

1. Please explain your opinions about teaching activities carried out through six thinking hats technique.
2. Which thinking style of the hats would you like to use more?

Data Collection and Analysis

Quantitative data of the study were collected in 2010-2011 academic year spring term in three phases; pre-test before the experiment, post-test after the experiment and permanency test that was conducted one month later. The data collected were analyzed by using SPSS 12 statistical package and arithmetical averages, standard deviation, independent, and dependent groups t-test scored were gathered. The significance level of values on the table was taken as $p<.05$. Qualitative data of the study were collected by the interview form at the end of the experimental study. The phases below were followed in the analysis of the collected data:

Phase 1 (Creating a Frame): Interview form was created as a result of meeting with experts and literature review.

Phase 2 (Processing the Data): The data collected through interviews were organized.

Phase 3 (Identification of Findings): Internal validity was increased after opinions of three experts were gathered and thus, the validity of collected data was ensured. Data organized according to expert opinions were identified.

Phase 3 (Interpretation of Findings): Identified findings were explained, correlated and interpreted in this phase.

Results

This part includes findings related to sub-aims of the study based on the research data.

Findings related to the First Sub-Aim of the Study

Related to sustainable development; before starting to research the effects of six thinking hats technique and teaching activities proposed in the curriculum on student success, to assess whether there was an academic difference between the experiment and control group, a pre-test was given to both groups. It was observed that scores of both groups were close with experiment group scores being ($X=53.26$) and control group scores as ($X=52.42$). Independent groups T-test results showed that there was not a significant difference between two groups ($t=378, p(.707)>.05$). Experimental research began as a result of this finding. A post-test was given to both groups to see whether there was an academic difference between students' academic success after six thinking hats technique and teaching activities proposed in the curriculum. Analysis of pre and post scores of the experimental group showed that there was a 22.21 point increase in this group as their pre-test score was ($X=53.26$) and post-test score was found to be ($X=75.47$). Dependent groups T-test results showed that this increase was significant ($t=-9.351, p(.000)<.05$). The finding gathered showed that this method also resulted in increase in student success.

Looking at the arithmetic averages of students in control group in which teaching activities proposed in the curriculum were used, it could be seen that their pre-test scores were ($X=52.42$) and post test scores were ($X=68.21$) which means that there is a 15.79 point increase. Dependent groups T-test results showed that this increase was significant ($t=-8.665, p(.000)<.05$). The findings gathered show that six thinking hats technique increase student success.

As a result of independent groups T-test result ($t=4.068, p(.000)<.05$) used to assess whether the success shown by post-test that was used to assess the

effectiveness of six thinking hat technique and teaching activities proposed in the curriculum was significant between groups, it was seen that the difference between groups was significant. That averages of experimental group ($X=75.47$), was found to be higher than averages of control group ($X=68.21$) revealed that teaching techniques used by six thinking hats technique increased success more than teaching activities proposed in the curriculum.

In order to assess permanency level in groups, a follow-up test was applied one month later than the learning-teaching process. The results of the follow-up test showed that arithmetic average for experiment group was ($X=69.52$) and that arithmetic average for control group was ($X=61.05$) which means that there was some forgetting in both groups. Independent groups T-test was applied to see if the scores in the follow-up test were significant between groups, and it was found to be significant ($t=5.069, p(.000)<.05$). To assess the level of forgetting, the difference between post-test and follow-up test of both groups were measured and t-test was used to see if the difference was significant. Independent groups t-test showed that ($t=-1.151, p(.255)>.05$) the difference was not significant. However, that arithmetic average difference between post-test and follow-up test for control group was higher (7.15) and then the arithmetic average for experiment group (5.95) revealed that remembering rates were higher in activities carried out with six thinking hats technique than activities carried out with activities proposed in the curriculum.

Findings related to the Second Sub-aim of the Study

Responses given by the students about teaching activities with six thinking hats technique were positive and are given below; the class was fun ($f=15$), there was higher participation ($f=14$), events were evaluated from different perspectives ($f=11$), cooperation led to more learning ($f=8$). Also, some students thought that teaching activities were tiring ($f=4$) and boring ($f=2$). The majority of the students responded the question "Which thinking style of the hats would you like to use more?" as white hat ($f=10$).

Discussion

The results of the study show that teaching techniques based on both six thinking hats technique and other teaching activities lead to increase in student success and that there was a significant difference in both applications (pre-test and post-test).

When post test scores of both groups are compared, a statistically significant difference was revealed in favor of experiment group. This result showed how students' analysis of subjects creatively and their ability to look from different perspectives and also their active participation in the problem-solving process could contribute to success. Similar studies support the findings of this study. Studies carried out by Aksoy (2003), Avşar and Alkış (2007), Aydın (2009), Bilek (2009), Can (2005), Debre (2008), Göncüoğlu (2010), Köseoğlu (2006), Özdemir and Uzun (2006), Sezer and Tokcan (2003), Şahin, Cerrah, Saka, and Şahin (2004), Yaman (2003), Yıldız, Baykal, and Altın (2002) showed that learning realized with teaching techniques that allow students to actively participate and learn by themselves affect success positively. This is influenced by the fact that students use their creative thinking skills during problem-solving process while learning subjects.

Teaching activities that are applied so as to develop creativity contribute to students' personal development (Atkıncı, 2001; Dinç, 2000). Proper use of six thinking hats technique that contributes to development of students' creative thinking skills is important for achieving the intended aims. This technique has a potential to facilitate process of working in groups, in other words, to lead students to think by turning group works into a game. Animasahun (2007) and Belfer (2001) stated that six thinking hats technique facilitate knowledge transfer, improve communication and decrease disruptive behaviors in classroom environment by having them to think from different perspectives.

Majority of the students preferred White hat, which could be attributed to the fact that students' past experiences were based on learning via traditional teaching methods.

It is also thought that since six thinking hats lead students to think from different perspectives in problem-solving process in addition to teaching the subject, it will give effective results in problem-solving process in real life situations.

Suggestions

- Six thinking hats technique gives effective results in specification of environmental problems in the problem-solving phase, also in terms of increasing students' success, curiosity, and interest in classes and in developing communication among students. Teachers can be advised to use six thinking hats technique in the process of improving students' creativity and problem-solving skills.

- It can be said that inclusion of activities to develop creative thinking skills in environment and society learning domain may affect student success positively.
- This study explores the effect of six thinking hats technique in teaching of subjects related to sustainable development in 11th grade geography class. It is thought that studies to assess the effect of other creative thinking techniques (brainstorming, attribute listing, role playing etc.) could contribute to learning-teaching process by comparing these methods and techniques.
- Similar studies to explore the similar effects in different lessons in secondary and primary school curriculum could be carried out.

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