Dimensions of learning process over global environmental problems:

An evaluation of roger conceptual learning method

regarding Turkish undergraduate students[*]

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Abstract: The main objectives of the study have been testing Roger conceptual learning method with regard to Turkish students and to investigate the applicability of the method on graduate students. The experimental group was formed by 10 volunteer students. The study lasted 16 weeks according to group discussion method. In this period, global environmental problems were handled under 8 headings. The research data was gathered from students' diaries or through semi-structured group interviews. The data was evaluated using the content analysis method. In the results of analysis, it was achieved that first three dimensions of Roger model were formed in most students and the last two dimensions were significant in some students. Therefore, it might be stated that Roger conceptual learning method handled in the study, not only with its conceptual but also emotional and pedagogic dimensions, functions similarly on Turkish graduate students as well.

Key words: environmental education; concern; global future; global environmental problems; university education

1. Introduction

Today's societies are facing global environmental problems such as ozone depletion, global warming, genetically modified food, water and air pollution and diminishing biodiversity whose consequences might be at international level. Consequences of global environmental problems, which clearly affect not only natural ecological systems but also social and economical life, causes most people to have anxieties about the present day and future. Ojala (2007) stated that people, who noticed the complexity of global environmental problems and their relationships with various other existences, developed feelings of loneliness, and accordingly, increased worries. Studies showed that worries are related mostly to the feelings of pessimism, helplessness and apathy (Connell, et al., 1999; Hicks, 1996). Bartiauxs (2008) on the other hand, considered ambiguities and contradictions as basic characteristics of today's societies. Hicks and Board (2001) reported that global issues caused people's life to be confused, fragmented, emotional, rebellious and stressful. Moreover, Hicks (2002) emphasized that denial and repression against world's real problems was characteristics of a lot of people. Slaughter (2007) reported that in students with such experiences, defensive mechanisms such as denial, avoidance

and repression emerged at high levels. These studies show that facing global environmental problems is an important experience for students. This situation has brought on the agenda; new scientific models and epistemologies which focus on causes and effects of problems; new perspectives such as social conditions, boundaries of human knowledge, the life itself and new perceptions of individuals and groups.

Some studies in the field of environmental education and futures research have identified the distress and alienation that many young people feel about the human condition. Studies carried out with college students show that students avoid from learning happenings, which threaten their lives, and global problems (Beck, 1998). A survey in England revealed that students are optimistic about their own future but pessimistic about global future (Hicks & Holden, 1995), while students subject to another survey conducted in Australia expressed pessimistic approaches for both their own future and global future (Hutchinson, 1996; Eckersley, 1999). In another study on the attitudes of the students towards environmental issues, it was observed that environmental problems cause students to develop disappointment, grief and pessimism (Connell, et al., 1999).

Learning global issues is effective on creating confused emotions in students. In this respect, learning process turns out to be a learning field on which substantial international research should be carried out. Broad studies on learning of global issues were conducted by Rogers in 1994-1998 and by Roger and Tough in 1996 in Ontario Institute, Canada. In the study, carried out with participations of 12 post-graduate students, as a result of responds of students during the interviews, researchers defined five dimensions such as cognitive, affective, existential, empowerment, and action dimensions, in which learning occurs, and therefore, proposed a conceptual learning model in learning global issues (Rogers & Tough, 1996). Stages of Rogers' model are as follows.

1.1 Cognitive dimension

Learning in the cognitive dimension constitutes the core of global learning process. In this dimension, some students, when facing global problems, might consider themselves out-of-touch or airy fairy and as a result of this, emotionally confused opinions develop in the individual's mind. Also, some temporary guidance at this stage might cause unusual responds from the students. They might as well feel pessimistic, overwhelmed and surprised when facing complex problems of the world.

1.2 Affective dimension

According to Rogers, there is also an emotional aspect of the process of learning global problems. Words such as regret, hopeless, scared, worried, nervous, depressed, unhappy, haltered and surprised express negative feelings and positive feelings are expressed by happy, hopeful and optimistic. Negative feelings are caused by dark scenarios regarding global future; ignorant attitudes of responsible people and many others and changes in the values due to the newly gained knowledge. Positive feelings on the other hand are caused by teaching methods, group psychology and optimism. This situation occurs when concepts, which were previously formed in the mind, change due to newly gained knowledge and different perception of knowledge because of personal values.

1.3 Existential dimension

This stage is the process, through which students restructure their personal understanding and values and re-question their aims of life. In existential dimension, students exercise deep thinking on global issues and future scenarios; question their aim of life, life style, values and beliefs; seek answers to some questions. The learning process of global problems and probable future scenarios might cause a deep emotional collapse. For some students, this means questioning personal values, aim of life, religion and beliefs together with all aspects of life. Through this process, students intend to find solutions and do whatever they can.

1.4 Empowerment dimension

Opinions and suggestions which students consider effective in finding solutions for the problems start to develop. It is the dimension in which personal responsibilities start to be admitted and willingness for doing something becomes evident. In this dimension, centralizing the question, "can one individual change things" the idea of finding solution emerges. However, in order to achieve this point, a satisfying emotional change should be obtained. According to Rogers, students should be supported with positive future scenarios and success stories in order to activate feelings of authority and responsibility. In addition, inspiring individual students or groups with careful optimism hope and humor will improve the process of feeling personal authorization and taking responsibility.

1.5 Action dimension

This stage can be named as the dimension, in which the process of learning global problems turns out to be the process of developing behavioral changes. In this dimension, students, considering their personal, social and political preferences, start a process of developing behaviors and forming solution oriented approaches. Rogers states that in this dimension, it can be observed that process of learning global problems; leads to new destinations in students' lives; guides them to new expansions in their both personal and professional lives.

In the year 2001, Hicks and Bord applied Rogers' model to a group formed by four college students (n=4) in England. Researchers reported that they observed first three dimensions but they couldn't observe the last two dimensions (Hicks & Bord, 2001). Hicks and Bord (2001) suggested that in order to be able to evaluate the internationally feasibility of the model, it should be applied in different countries. Since there had been no sufficient research on the issue, the idea of making helpful contributions to international literature by the investigation of this model on Turkish students, has been effective in choosing the research issue. Hicks (2002) also showed how students in courses on global futures undergo distinctive psychological changes which proceed from cognitive, affective, existential, and empowered, to action. The main objectives of the study have been to test Roger's model on Turkish students and also to see whether this model is applicable at college students' level.

2. Method

This study was conducted in 2006-2007 educational year with participation of fourth semester students. Prior to selecting the subject students, information about objectives and extend of the study was given to the class (n=42) and 16 volunteer students were picked. Some preliminary sessions were held with these 16 students and they were given more detailed information about the process of the study. Following these sessions, two students resigned due to their lack of time and other four students refused to participate stating; "We can't solve these problems by discussing. What are we going to discuss?" The study was continued with 10 remaining students.

First 6 sessions were conducted by researchers and the last two were conducted by the members of the experimental group of students. Their participations were certificated. The hall where debates took place was furnished with an oval table and a wardrobe for each student for their personal belongings and materials. Pieces of equipment and facilities such as, a board, access to the internet, laptops, a projection device, a camera, a voice recording device and other consumables and thus a learning environment was provided as well.

Global environmental matters were handled under 8 headings: ozone depletion, acid rains, nuclear energy, desertification, rain forests, genetically modified organisms, green house effect and global warming and climate changes. Each issue was discussed within four subtitles such as definition of problem, anthropogenic factors on the occurrence of the problem, effects of the problem on humans and other creatures, and suggestions for

reversing the problem. The study was completed in 16 weeks, including one week intervals between each debate which lasted for a week consisting of number of three hour sessions.

2.1 Data collection

The data were collected through researcher's diaries kept regarding each debate matter; students diaries in which they expressed their weekly observations, their feelings about the debate matter and their opinions about the method; observations of the researchers after each session and semi-structured interviews with the students at the end of 16 weeks.

2.2 Data analysis

The data gathered from diaries which were kept according to Roger's model, students' diaries and results of semi structured interviews were comparatively evaluated according to content analysis. In categorization of the data, theoretical framework of the study has been taken into consideration (Höijer, 1990). First, a key including the stages of Rogers's model and their characteristics was organized and each step was given a number. Next, the data collected from each day's discussions were read in detail and compared with the guideline. Then concepts related to each dimension were marked and finally, dimensions of Rogers' model were investigated (Punch, 2005).

3. Results

When results of the learning process of environmental problems are evaluated according to Roger Model, it is grouped into five dimensions as: cognitive, affective, existential, empowerment and action dimensions. Studies conducted so far support these results. Hicks and Bord (2001) reported that it could not to observed empowerment dimension and action dimension in their research probably because of the nature of this first-year course. They explained that issues of empowerment and action are highlighted more in later second and third-year modules. Emphasizing the fact that students in global future education process experienced evidently distinctive psychological changes, Hicks (2002) stated that process of learning is actualized in five steps as cognitive, affective, existential, empowerment and action. Another important result of our study is that some students in the first three-steps of learning process of global environmental problems had the feeling of out-of-touch. Emergence of this feeling changes from student to student and it becomes evident at the stages when issues of solving the problems are discussed. The expressions, "Let us go. This issue is beyond our capabilities" by some students at the problem solving phase of discussion process support this result. On the contrary, Rogers and Though (1998) pointed out that this feeling might occur especially at the first step. Hicks and Board (2001) on the other hand reported that they did not observe any students who consider themselves out-of-touch.

According to the results for the cognitive dimension of Roger's model obtained in our study, it was understood that some students perceived the concept of global environmental problems as multi-dimensional, complex and unsolvable. Some students facing the complexity of global environmental problems felt cognitively overwhelmed and confused.

> This issue sounds a little confusing to me. To be frankly what is wrong and what is right is not obvious.
> Ignorance of people and governments taking no measures on the issue naturally bring about the irreversibility.

It was also observed that some students, confronting those dimensions of global problems, were not able to form a certain opinion and some rather had pessimistic ideas about the future but there were also some students who kept their optimism in spite of all.

> After learning all these, I feel unhappy, regretful and worried, but I am not hopeless because I believe if people are made aware of these problems and measures are taken, this ongoing can at least be stopped.

Similar results were found in other studies. Hicks (2002), Hicks and Bord (2001), and Rogers and Tough (1996) stated that some students might get confused, some might have optimistic and some others might have pessimistic feelings for global environmental problems. These results can be explained as the results of; multiple variable factors (from production to consumption) of global environmental problems; insufficiency of solution oriented political and technical approaches and people's negative attitudes towards present environmental problems (Ojala, 2007). When the issue is handled from this perspective, it can be stated that some students had had these feelings before starting the learning process. Conducted quantitative studies show that students' knowledge on global environmental problems is quite insufficient or full of misconceptions (Groves & Pugh, 1999). Most students believe that these problems can not be solved and the world has come to an end and they feel lonely and helpless (Oluk, 2009). The expressions, which were made by the students, who resigned from the study, such as: "What are we going to discuss? Can these problems be solved by discussing?" Support this result. At the first step, present global environmental problems and new realities, concepts and opinions related to their possible future effects are learned. The knowledge, opinion and approaches gained at this stage constitute the core of future learning.

The results in terms of affective dimension shows that emotional developments among the students also accompany the learning process of global environmental problems. Students used the terms: regretful, hopeless, frightened, concerned, nervous, unhappy, depressive, hateful, guiltiness and surprised when expressing their negative feelings and used the terms: happy, hopeful and optimistic, when expressing their positive feelings. In addition to these feelings, sorrow and sadness emerged in some students. Some other students said they were excited.

> I get frustrated with the fact that plants are being genetically modified. Although this process is not commonly exercised, one day it will be widespread and surround us. The selfishness of the mankind will spoil all natural food.
> Their irresponsibility towards life has frightened me. At this moment I have started to worry about how my grand children or their children will live in this world.
> When I learned how rainforests disappeared I felt guilty. In fact, realizing the fact that a tree was cut down to make this particular piece of paper I am writing on, added on my guiltiness.
> Following the unhappiness left upon me last week, this week's problems made me feel more unhappy and helpless, When I learned that a great number of living creatures might extinct due to the harmful effects of acid rains on living and non-living environments, I felt very sad and got concerned because I didn't know about this fact.

In this regard, we can state that students have rather negative feelings during the learning process. Negative feelings of the students arised from; dark future scenarios; ignorant behaviors of responsible ones and many other people; change in values due to currently gained knowledge. These results show similarities to those of previous studies. These studies stated that learning process of global environmental problems cause feelings such as: hope/hopelessness; happiness/unhappiness; courage/fear and that these responsive feelings might occur at different levels depending on the formation process of the knowledge and individuals' own state of mind (Roger & Tough, 1996; Hicks & Board, 2001). Positive feelings, on the other hand, might come out of the teaching method, such as group psychology and/or personal optimism.

Another observation was that students did not have these feelings statically, they altered from optimism to pessimism from time to time. In contrast to general pessimistic outcomes of the sessions, it was also observed that students considered their levels of concern they had during learning as an essential learning motivation source.

> I hadn't had much knowledge about the structure of the ozone layer, possible results of problems and the ways they

> can be reversed. Naturally, my level of concern was lower than it is now but this week everything has changed. I have more knowledge about the ozone layer but I must admit that my level of concern has increased greatly. To me it's a positive development because I believe; to solve a problem it is necessary to have concerns about it, to spend effort and to suffer from the painstaking process otherwise, only intention doesn't help.

In addition to these feelings, sorrow and sadness emerged in some students. In this regard, we can state that students have a higher concern level than the average during the learning process of learning global environmental problems.

Results concerning the existential dimension showed that students, following the emotional moments, started questioning their own life style and destination as well as individuals and institutions which they consider responsible for the problems. This trend has become a manner of questioning some institutions, systems and other people which they consider responsible. Existential meaning can be established by engaging in issues that transcend one's own self, to find a larger purpose in life and to take part in creative and productive actions (Tudor, 2003).

> If people fulfill their parts of the task and if the governments of the countries admit their responsibilities and act accordingly, we might have a chance. Unfortunately chances are quite low because doing so, countries' interests might get affected negatively.

Some students chose the way of self-criticism.

> I had already known something about the depletion of ozone layer but learning about my own contribution to the ozone depletion disturbed me very much, no matter how much I care.

It was found out that students who criticized themselves experienced some changes in terms of perceptions.

> I am aware of the fact that each season is getting hotter compared to the previous one but I didn't know we would suffer from lack water in the next 10 or 15 years. I had no idea at all that depletion of the ozone layer could cause such serious problems. I learned about the facts during the discussions. What are we doing, why are we doing and how could we be so irresponsible without considering the consequences?

Within the same process some questions among the students arose in terms of finding solutions.

> When I learned the fact that CFC gasses, which are the leading ozone depleting gasses, are used in air conditioners, deodorants, sprays, fire extinguishers and many other products and that I also contributed to the problem myself, I felt extremely sorry. From now on I am worried about life; I have focused my thoughts on reversion of ozone depletion; I have questioned myself about what we can do.

Some students who were introduced with the scales of the future disasters which might occur because of global environmental problems drew a dark future scenario and stated that they wouldn't be able to do anything for the solution of the problems in that particular scenario.

> Realizing the fact that I was unaware of these threats and have been contributing them unconsciously made me very sad. Unfortunately there is not much I can do.

The results we have achieved are similar to the results of previous studies on the issue. Researchers of those studies reported that in the existential dimension, students were led to deep thinking on global issues and future scenarios; questioned their destinations, life styles, values and beliefs and tried to find out answers to some questions as well (Rogers & Tough, 1996; Hicks & Bord, 2001). This existential stage was also a turning point, where student begun to integrate his/her concerns about global futures into his/her life (Ramos, 2005). It was revealed that this stage which, was handled by Richard Slaughter with a pedagogical approach, formed the

inspiration for empowerment stage (Slaughter, 1999).

It can be stated that students in the existential dimension show intention and capability of gathering, using, comparing and evaluating the information effectively. Within this dimension a desire for finding solutions and doing something emerges. These results show that critical thinking dominates students' minds in the existential dimension. Critical thinking is characterized by its aspects of focusing on the topic, analyzing discussions, asking explaining and challenging questions and answering, questioning the sources of the data, judging the data and concluding results (Ennis, 1991; Mason, 2007). Critical thinking is a guideline for the individuals in solving problems. In stressful situations that are not easily changed it is important to complement problem-focused coping with cognitive strategies for creating meaning. Hungerford and Volk (1990) also stress that critical thinking and action competence was an important educational objectives for behavioral changes. These results indicated that learning about global environment problems and possible futures can also lead to a deep soul-searching.

The results concerning empowerment dimension show that some ideas and opinions, which students consider to be effective in solving global environmental problems, begin to form in their minds. Some students, starting from the belief that these problems emerged due to international activities, maintained that they could only be solved by international concerted actions but some others disagreed.

> This problem doesn't seem to be solved by individual efforts of anybody. Also states should want it to be so. It's difficult but why not?

On the contrary, most students argued that problems are caused by humans, and therefore, in the process of developing solutions, people should be made conscious.

> We still have little chance. No matter how small it is, there is still some hope. I hope people realize what they are doing and stop damaging the world before it's too late. However, I am not hopeless because if people are made conscious about the issue and measures are taken, I believe, ozone depletion at least can be reversed.

Also number of students admitted that they themselves also use technological products that are pollutants and stated that they could contribute to the solution efforts by individually controlling the use of those consumer products.

> Genetically modification of plants at this speed, must be stopped. We must get organized urgently. It is advancing disguisedly before our eyes. Only a conscious society can say no to this.

Some students stated that these problems couldn't be solved, but the others opposed the technology that cause global environmental problems and suggested alternative solutions. Empowerment exists in the form of control, competencies and goal seeking behavior (Ozaralli, 2003), and can emerge in the form of self managed teams or communities of practice which are assigned the responsibility to manage their assigned tasks. In this context, empowerment requires that effective decision-making authority is assigned to individuals and teams responsible designing and producing work (Ford & Fottler, 1995). Rogers and Tough (1996) claimed that when students are well motivated in terms of solving the problems, they can feel their individual power in the process of problem solving and thus willingness appears.

Results regarding the action dimension show that some students, together with solution suggestions, developed some behavioral changes in terms of using water, paper and electricity sensitively and minimizing or completely stopping use of deodorants. In order to understand whether actual learning occurred, students should be able to understand a new idea or an opinion, should be able to perform an activity which he/she hadn't been

able to perform, should be able to produce new concepts out of previously known concepts, should be able to put into practice the learned skills and knowledge, and should be able to understand and evaluate others' behaviors and capabilities.

> I have become more conscious about the problems. I couldn't even guess how tragic our end would be. Now I am using electricity and water more consciously and informing people around me." "I am more sensitive now when using water. I stopped using deodorants and I am doing my best in order not to pollute the air. The study made me notice all these. In fact, it woke me up because I had discussed global matters with other people and hadn't been able to produce any solution suggestion. I didn't use to pay attention to these matters. For instance, paper consumption. Now I am careful about how much paper I consume and trying to be more conservative.

Although most results showed similarities to those of Rogers and Tough's (1996), action dimension couldn't be observed in most students. This can be explained with the difficulty of deciding whether learning occurred after a process. Uzunöz (2000) claimed that a person who learned a skill or information will sooner or later have a change in his/her behavior but behavioral changes are required to be long term or permanent so that they can be accepted as indicators of learning. However, some students' mentioning that they have developed behaviors in terms of action dimension can be evaluated in a way that learning about global futures had eventually lead to a significant reorientation of their lives, both personally and/or professionally.

4. Conclusion

The learning process of global environmental problems clearly affects the students as other global issues do. This situation, which is mostly observed as a negative effect, should be carefully considered by other educators. It could be probably said that learning process of global environmental problems increased the level of concern in students. Concern is a state of mind that includes one or more of feelings such as, sadness, boredom, fear, failure, desperation, being unable to foresee the end and being judged (Twenge, 2000), and as Öztürk (2002) stated, is perception of vanishing visa verse existence and values directly to vanishing. The increase in the concern level of the student decreases learning partially, and therefore, lowers the success ratio. Although a certain level of concern is needed for learning, its balance should be regulated with care (Baltaş, 2004). In other words, these concerns can be defined as existential anxiety (Giddens, 1998). May (1996) defined existential anxiety as normal anxiety which constitutes an important part of life. Because of this, despite their negative characters, anxiety and worry also has motivational effects (Ojala, 2007). A moderate level of concern can affect learning positively but too much or too low level of concern can affect it negatively (Ankay, 1990). Hicks and Bord (2001) claimed that teachers in elementary, secondary and university education ignored all other factors affecting learning process of global issues and focused only on cognitive structural strategies. It can be stated that in learning processes which are conducted in this way and learning environments, in which emotional dimension of the learning process is ignored, the level of anxiety increases, thus, restrict learning. In this respect, process of learning global environmental problems should be handled with a significant pedagogic approach.

Learning global environmental problems should be, open to interaction between students, relaxing, liberal so that they can express themselves freely and be equipped with educational technologies which support their critical thinking and creativeness. Lazorowitz and Karsenty (1990) stated that learning atmosphere reflects the social state of the school and the class and in this atmosphere learning process takes place between teachers; between students and also between students and teachers. Most people are not motivated themselves to reflect, because it involves

feelings of uncertainty and ambiguity (Hermans & Hermans-Jansen, 1995). An important factor, together with the quantity of such interactions and communications, is their quality, which in turn influences the learner's satisfaction, self-image and his/her learning process.

That teaching strategies of global environmental problems are student oriented will ease learning. The teaching strategies, in which students' previous knowledge is evaluated; which are based on students' experiences and through which informative and social constructiveness is applied effectively will support creative sides of students (Geijsel & Meijers, 2005). Interactive learning environments will be effective on them in terms of expressing their feelings and emotions in a controlled way (Law, et al., 2002). The learning process which takes place within this framework is also important because it helps one who wants to learn how to learn. In all learning processes the role of the teacher is to help the person to keep him/her self open to learning. Therefore, the individual can identify his/her learning problems and necessities, listen to credible critics on his/her behaviors and accept them. In achieving effective and sufficient learning, a successfully operated learning process is very important. In this respect, it cannot be stated that teaching process, in which problems are identified; defined and solutions are suggested academically only, are supportive enough in terms of teaching global environmental problems. Besides, results of both national and international studies show that at the end of teaching processes of global environmental problems conducted in traditional learning environments, a great amount of misconceptions is formed in many students' minds (Meadows & Wisenmayer, 1999; Pekel & Özay, 2005; Kabapınar, 2006).

Process of learning global environmental problems is realized in five dimensions. These dimensions come up in unity during the learning process. Because of this, teachers should pay attention to each dimension and each dimension should be examined in detail. Bower and Hilgard (1981) stated that the observed changes cannot be considered "learning" unless processes, particularly when they are fast and in a row, are considered important and behavioral changes are complete. Cognitive, affective and existential dimensions are the exploring phase of the learning process and at this phase students' feelings emerge clearly. Therefore at this stage, methods and techniques, which will lower the anxiety level of the students but increase the motivation, should be used and strategies should be developed. Concept cartoon stories might be helpful in making the learning process more entertaining (Oluk & Özalp, 2007).

Behavioral developments and changes were experienced in the empowerment dimension and action dimensions. In these dimensions, making use of the changing-power of education, strategies, which support developments and changes in students' behaviors, should be used. Strategies oriented only in changing values and attitudes won't achieve the desired success in the learning process. In this regard, sharing real success stories with students; informing them about; national and international environment protection-oriented activities, latest technologies; things can be done individually and also making suggestions in that manner will make the process more effective.

Rogers and Tough (1996) developed conceptual learning model with the study carried out with post-graduate students. The results of this study prove that this model can be applied to under graduate students as well.

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