Sustainability in higher education: A needs assessment on a course "Education and awareness for sustainability"

Mehmet ERDOGAN

Akdeniz University, Faculty of Education,

Department of Educational Sciences

07058, Antalya, TURKEY

Email: mmerdogan@gmail.com and mehmederdogan@yahoo.com

Received 17 Sept., 2009
Revised 26 May, 2010

Contents

Abstract

The purpose of the study was to make an assessment on the needs of university students regarded to be aware of environmental problems and sustainable development concept introduced in an undergraduate course. As a first part of

course evaluation project, the needs assessment (NA) study comprising three steps was realized with 85 undergraduate students enrolling in the course Education and Awareness for Sustainability. NA questionnaire including both open-ended and closed-ended items was used for data collection. The responses to open-ended questions were subjected to content analysis whereas those to closed-ended items were subjected to statistical analysis. As the results suggested, students believed that education was the fundamental stage to constitute awareness for sustainability. The students indicated that the use of methods of discussion and brain storming were the best methods, and the instructional media such as computer and projector, video, and OHP were essentially important for developing awareness for sustainability. Almost all the students reported that the course aiming to introduce education and awareness for sustainability was beneficial for them to integrate the concept to their own profession and to develop awareness and sense of responsibility for protecting environmental resources.

Keywords: Education for sustainability, awareness, needs assessment

Introduction

Education for sustainability is an evolving concept that encourages people to think about their responsibilities for creating a sustainable future. The roots of this concept go back to 1960s-1970s when the environmental education movement gained momentum. The evolution of environmental education in the 80's developed around so called, green environment, and with the renewed efforts to reconcile the economy with the environment under Agenda 21. From these events, new aims were introduced including the reorientation of education towards sustainability with a particular emphasis on public awareness and the role of training of young people. Prior meetings and research has made gains in sustainability for higher education. Thus, in order to better understand the reflections of this concept on higher education and to understand the framework and trends of sustainability in higher education, it may be useful to look at the declarations summarized chronologically in Table 1 (Wright, 2002). The term sustainable development and its relationship with the environment were extensively identified in many of these declarations. After the Thessaloniki Declaration (UNESCO, 1997), the Earth Charter in 2000 on the principles and aspiration on sustainable development, the 2001 Lüneburg Declaration on the higher education for sustainable development and the 2002 Ubuntu Declaration on education,

science and technology for sustainable development were realized for the integration of sustainable development concepts in education (dé Rebello, D., 2003). Universities have been challenged to adopt the principles of these declarations and many have signed agreements to be sustainable (Wright, 2002). Some have integrated these principles in their policies. As indicated by Herremans and Reid (2002), for example, in order to make the students understand the concept of sustainability and stewardship, models and processes must be created during the instruction that will help construct a bridge between the real world and the classroom. They represent a model that includes economic, social and environmental values. The overlapping area of these three values addresses the concept of sustainable development. Furthermore, in 2002, UNESCO dedicated 2005-2014 as the UN Decade Education for Sustainable Development, for the international implementation of the concept throughout world (UNESCO-CONNECT, 2005).

Table 1. *Chronological order of some selected declarations associated with sustainability in higher education.*

Year	Declaration
1972	The Stockholm Declaration on the Human Environment
1977	Tbilisi Declaration
1990	The Talloires Declaration
1991	The Halifax Declaration
1992	Report of the UN Conference on Environment and Development - Chapter 36
1993	The Kyoto Declaration
1994	CRE Copernicus Charter
1997	Declaration of Thessaloniki
2000	Earth Charter
2001	Lüneburg Declaration
2002	Ubuntu Decleration

Developing university students' awareness of sustainability is a complex process. Incorporating sustainability into university policy, curriculum (de Ciurana & Filho, 2006) and decisions (Moore, 2005) will provide opportunities to become aware of this concept and its contributions. Integrating the concept into the university curriculum, which plays a great role in shaping the society, will orient society

towards a sustainable life. It will help university students look at their profession with a wider angle and help them integrate the concept with their own subject (de Ciurana & Filho, 2006). In order to obtain the desired outcome of developing awareness on sustainability, the questions that need to be answered are: "Where are we now?"; "Where do we want to be?"; and "How will we get there". These questions were identified by Cook (2005) as three basic points of the learning needs assessment process. Need indicates the gap between the current (present) state and the desired state. It also refers to what is required and/or desired to fill the discrepancy (Witkin & Altschuld, 1995). Sometimes, it refers to determining problems coming out and pertaining. In the professional educational literature, researchers tend to categorize the needs assessment under the broader heading of program evaluation (Stufflebeam et al., 1984). Conducting a need assessment (NA) with the target group assists in determining what needs exist and how these needs should be addressed. Determining needs and improving and/or developing the instruction and curriculum based on these emerging needs enable learners to be more responsible for their learning process. If the needs of students are more fully integrated into the course implementation, learning the main concepts will be more meaningful, and students will be more willing to attend the course and learn the concepts. Therefore, in order to make the instruction more effective and more efficient, learners' needs must be considered.

The available literature indicated that there is no study in Turkey dealing with needs and expectations of students in higher education in the area of education for sustainable development. The research that may be related to the subject dealt with investigating the needs and expectations of graduate students who would become faculty staff in the future (Akpinar & Paykoc, 2004), and also with the current views and expectations of undergraduate students in terms of instructional strategies used during the lectures, facilities offered and faculty and staff (Pinar et al., 2005). It is believed that present study will be one of the initial studies in this area and will shed light on course development studies on education for sustainable development in the context of higher education.

Purpose

The purpose of the study was to make an assessment on the needs of university students regarded to be aware of environmental problems and sustainable development concept introduced in an undergraduate course. Their needs related to

the aims of the course, instructional methods and media and evaluation methods were explored during NA.

Method

This descriptive study was designed as a NA study as a part of course evaluation including three main steps consisting of NA, formative assessment and summative assessment. In the present study, the NA process addresses mainly to two issues: (1) assisting in determining what needs exist and how these needs should be addressed, and (2) providing criteria against which course merits can be evaluated; that is, the degree to which is intended or important human needs are addressed. A university level course entitled Education and Awareness for Sustainability was the target of this assessment study. The basic description of the course is given below.

The Course: "Education and Awareness for Sustainability"

The "Education and Awareness for Sustainability" (EAfS) course has been offered for six semesters by the Department of Elementary Education in the Faculty of Education at the Middle East Technical University (Ankara-Turkey). It is an elective course and available to all students enrolled in the university. The aim of the course is to develop environmental awareness and sensitivity among undergraduate students. As indicated in the course syllabus, the main goals of the course are to: (1) help the learner understand how daily life and work can be adopted to improve the environment; (2) acquire awareness and sensitivity to the whole environment; (3) acquire social values, strong feelings of concern for the environment and motivation for actively participating in its protection and improvement; (4) acquire a personal view of general and global environmental issues; and (5) ensure that, students understand that they are part of the natural circle of life.

Participants

Eighty-five undergraduate students enrolled in the Education and Awareness for Sustainability course participated in the study. The characteristics of the participants are summarized in Table 2.

Table 2. *Characteristics of the Participants.*

	# of the students			
Name of the Faculty	**Male**	**Female**	**# of the students**	**%**
Education	16	52	68	80
Engineering	8	5	13	15
Economic and Administrative Sciences	2	2	4	5
Total	26	59	85	100

As seen in Table 2, 26 of the participants were male while 59 were female. Eighty percent of the participants were comprised of the students of the Faculty of Education. Among them, 27 were from Elementary Mathematics Education (EME), 18 were from Elementary Science Education (ESE), eight were from Foreign Language Education (FLE), six were from Early Childhood Education (ECE), four were from Chemistry Education (CHED), three were from Physics Education (PHED) and one was from the Computer Education Department (CEIT). Among the Faculty of Engineering students, seven were from Geology Engineering (GeoE), two were from Mechanical Engineering (ME), two were from Food Engineering (FE), one was from Electric Electronics Engineering (EE) and one was from the Mining Engineering departments. Among the students from the Faculty of Economic and Administrative Sciences, two were from Business Administration (BA), and other two were from Political Science and Public Administration Department.

Instrument

The need assessment questionnaire (NAQ) developed by the researcher for investigating undergraduate students' needs, expectations and pre-knowledge about the course of EAfS was used for the data collection. The NAQ consists of three sections, eight sub-sections and a total of 53 items. 17 of the items were open-ended and 36 were closed-ended questions on a Likert type scale. The sections and sub-sections of NAQ are summarized in the Table 3.

Table 3. *Sections and sub-sections of NAQ.*

Sections	Sub-sections	Purpose	Question type	# of the items
I	1.1. Background information	Determining students' demographic information	Open-ended	4
II	2.1.The Course (general)	Determining students' general expectations from the course	Open-ended	6
	2.2.Instructor' and Students' roles	Determining expectations on the instructor's and students' roles	Open-ended	2
	2.3.The Course (specific)	Determining students' specific expectations from the course (i.e. schedule, time, objectives, content)	Closed-ended (Likert type scale)	12
	2.4.Instructional Methods and Techniques	Determining students' expectations of the frequency of the use of the instructional methods and techniques, and the degree of their importance	Closed-ended	9
	2.5.Instructional Media (materials)	Determining students' expectations of the frequency of the use of the instructional materials and the degree of their importance	Closed-ended	7
	2.6.Evaluation	Determining students' expectations of the frequency of the use of measurement and evaluation and the degree of their importance	Closed-ended	8
III	3.1. Attitudes	Determining students' general attitudes toward the course	Open-ended	5

The frequency part of sub-sections - 2.4, 2.5 and 2.6 were on a four point scale [1-never and 4-always], whereas the importance parts of these sub-sections were on a five point scale [1- not important at all and 5-very important]. Before administering the NAQ, it was reviewed by the course instructor, an expert on education for sustainable development, and an expert on curriculum development and evaluation in order to obtain their opinions of the content coverage of the

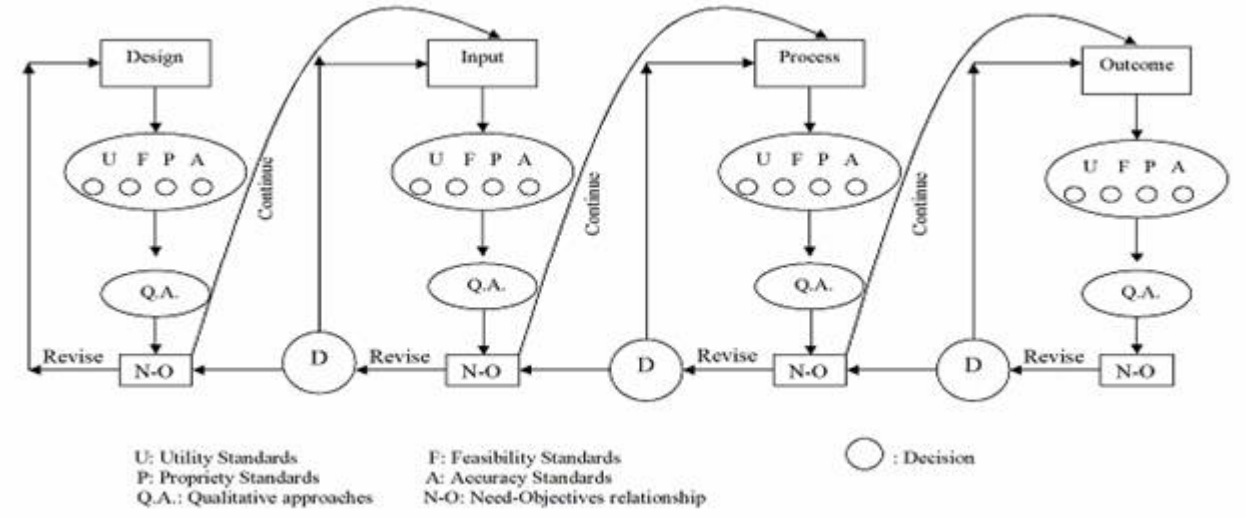
instrument. Content validity and face validity of the NAQ was assured by getting expert opinions. Since the items were already grouped based on the formal interview with the instructor and curriculum evaluator, no factor analysis was conducted to reveal the factor structure behind the NAQ. SPSS reliability analysis was only applied to sub-section 2.3 (see Table 3), which included Likert Type items. Cronbach's Alpha (a) of this part of the NAQ was .77.

Data Collection and Analyses

This study is the first part of a course evaluation project undertaken for the EAfS class. The project was realized in three steps including the NA, formative assessment and summative assessment.

The four stage DIPO model given in Figure 1 was used in order to evaluate the course overall. The model emphasized determining students' needs (and/or expectations and priorities), adapting the program to the determined needs and detecting if these needs are matched to the program objectives. The stages of DIPO are parallel to those of the CIPP model (Stufflebeam, 2003).

Figure 1. *DIPO Model for course evaluation .*



The NA was the first step of the model and was essential for conducting the rest of the evaluation. This step of DIPO evaluation model focuses on the needs-objectives relationship. The basic standards considered during the evaluation, on the other hand, are utility, feasibility, propriety and accuracy, as suggested by Joint Committee on Standards for Educational Evaluation (1981). The NA addressed the

first step of the model and further consisted of three sub-steps: (1) preparation or planning, (2) instruments developing and operating - data collection and (3) analyzing and reporting the data.

Planning Needs Assessment

Before conducting the NA, a formal interview was carried out with the instructor of the course, one curriculum and evaluation specialist and one former student from the course. Then, a tentative instrument was prepared based upon their reports and comments. The draft instrument was later given to an expert on curriculum evaluation and to the instructor for further revisions. Some of items were revised and a few questions were added depending on experts' critique.

Operating Needs Assessment

Once the instrument was developed, the application was performed in two days for two sections in the class setting. The NA was carried out at the beginning of the class (semester) in order to determine the needs and priorities of the students regarding instructional materials, teaching methods and evaluation procedures to be used in the course. A few students were absent during the NA. Before conducting the NA, the purpose and rationale of the study was clearly explained. The students were assured about the confidentiality of their responses. They seemed to be volunteering to complete the application.

Reporting Needs Assessment

Since the NAQ included both open-ended and closed-ended items, both qualitative and quantitative methods were used for the analysis. The open-ended responses were subjected to content analyses, i.e., coding and categorization. The quantitative data was analyzed statistically through making use of SPSS, and mainly descriptive statistics (mean, standard deviation and percentages) were used.

Results

Definitions of the Basic Terms

The course emphasized three broad topics: education, awareness and sustainability. Students' previous knowledge on these topics and their misconceptions were examined with a single question.

Most of the students defined the term education as the intended process of changing behavior of the learner or individuals and changing behaviors from negative to positive. Some reported that education was a permanent, deliberate and observable process which provided different viewpoints and thinking skills for individuals. According to the students, education was a life-long process that should be required for all because it prepared and shaped the individuals for real life, it provided moral development for individuals and it created social interaction among them.

The other term sustainability was defined as a means to ensure longer-term solutions to remedy the depletion of natural resources. They reported that sustainability was more associated with the continuity of natural recourses for future generations. They believed that it provided a balance among social, economic and ecologic life of a society, and that the concept was a means to develop and protect the existing values and beauty of nature. Moreover, stabilization, balance, continuity, protection, recycling, reasonable use, minimum use, preserving, renewing, development and education were the key words that the participants used in their definitions of sustainability.

Students' definitions of the term awareness included three major aspects, each pertaining to cognitive (refers to intellectual skills), affective (refers to emotional skills) and psychomotor (refers to motor or physical skills) development. They defined awareness as realizing what happened in the natural environment through direct observation and experience. These students believed that their knowledge and perceptions of the environment were highly associated with the awareness of the environment. They further indicated that once you were knowledgeable about the environmental problems and developed a positive environmental attitude, it was exact time to take action on solving these problems. Thus, students' responses can be summarized as when they became aware of the environmental problems, they would become knowledgeable about it, they would then develop positive attitude

towards the environment, and as a result, they would act upon overcoming the environmental problems. When the students were asked to identify the relationship among these three concepts, on the other hand, they reported that there was a strong relationship among these concepts and that they were complementary of one another. Education was conceived as the key or fundamental stage to constitute awareness for sustainability.

Students' General Expectations from the Course

Students reported various reasons for taking this class. Most believed that the course would help increase their level of environmental sensitivity (n=49), knowledge (n=48), awareness (n=47), understanding of sustainability (n=46) and sense of responsibility (n=37). As the students' responses emerged, their expectations from the class differed. Some were interested in learning balance among production, natural sources, consumption and environment; some in gaining environmental awareness, consciousness and sensitivity; some in learning their responsibility as a civic duty; and some in understanding the importance of environment for individuals. Some of the specific expectations of the students from the course were to instill environmental consciousness and sensitivity; to be knowledgeable about environment, environmental problems and sustainable development, environmental organizations and their activities; to understand the influences of human being on environment and to minimize these effects; to learn how to be a part of the sustainable development movement; to learn about the how to deal with environmental problems; to be aware of environmental issues in Turkey and in the World; to gain a wider perspective on the environmental issues; and to come up with alternative solutions for solving environmental problems.

The course itself included only a theoretical part. However, the students indicated the necessity of the practice part for the course, because they claimed that learning by observing, doing, experiencing, living, touching, feeling and exploring would be more permanent and meaningful for developing awareness of sustainability. During the practice hour, they suggested that field trips, factory trips, proficient organization trips and nature trips should be organized.

Students' Expectations on Teacher and Student Roles

The students in the current study stated that the instructor should act as guide, motivator, informer, sometimes active, sometimes passive, facilitator, encourager, interactive, not dominant, illuminating, charismatic and democratic in tailoring the class discussions and getting attention of students to the subject under investigation. In addition, they indicated that the instructor should be knowledgeable about the environmental issues, sometimes have a sense of humor, help develop curiosity, make the students think, and create and encourage class discussion on environmental issues.

In relation to their roles in classroom, students stated that they should act as interactive, concerned, sometimes passive, sometimes active, careful listeners, problem solvers, and critical thinkers. They believed that students should participate in class discussions voluntarily, produce solutions to problems, share their views with others and be ready to act and learn.

Students' Specific Expectations from the Course

Students reported that following issues regarding instructional planning process should be designed in line with their needs and expectations: (1) the outcomes and objectives of the course given in a course syllabus (M = 3.87), (2) the content of the course (M = 3.68), (3) instructional methods and techniques (M = 3.98), (4) instructional materials (M = 4.03) and (5) measurement & evaluation methods (M = 3.92). They also stated that they would like to be informed about the rules and procedures to be used in the class (M = 3.96). Fifty-eight students indicated that the office hours should be set by the instructor, in order for students to talk about their needs and problems (M = 3.67) regarding the course. Most of the students disagreed on the adequacy of the class size for conducting classroom activities (M = 2.43). As it was also understood from the students' responses that they were satisfied with the course content and they found it was designed in an interdisciplinary manner (M = 3.90).

Students' Needs on Instructional Methods and Techniques

The students believed in the importance of using diversity in the chosen instructional methods and techniques for the EAfS course. They reported that methods of discussion (M = 4.30), brain storming (M = 3.86), individual project

work (M =3.36), small group work (M = 3.36), in-class-group work (M = 3.31) and large group work (M = 3.27) were highly important for this course, whereas lecturing (M =2.93) and tutorials (M = 2.89) were relatively less important.

The students stated that the methods of discussion (M = 3.09) and brain storming (M = 2.98) should be used frequently during the lectures, whereas the methods of lecturing (M = 2.47), small group work (M = 2.28), individual project work (M = 2.27), in-class-group work (M = 2.25), large group work (M = 2.20) and tutorials (M = 2.10) could be used from time to time during lectures.

Students' Needs on Instructional media

The students reported the importance of various types of instructional media for the EAfS course, including computer and projection machines (M = 4.5), visual materials (M = 4.25), videos (M = 3.89), a television (M = 3.62), research materials (M = 3.55), an OHP (M = 3.53) and a tape-recorder (M = 3.17).

Students indicated that computer - projection machines (M = 3.59), visual materials (M = 3.16), videos (M = 2.84) and an OHP (M = 2.79) should be frequently used during the course implementation, whereas a tape-recorder (M = 2.55), research article (M = 2.54) and television (M = 2.53) could be used rarely.

Students' Needs on Evaluation Procedures

Students reported that self evaluation (M = 3.95), teacher evaluation (M = 3.87), product-oriented evaluation (M = 3.59), project-based evaluation as a group (M = 3.58), project-based evaluation as an individual (M = 3.57) and process-oriented evaluation (M = 3.47) were respectively important for the EAfS course. On the other hand, the portfolio assessment (M = 2.98) and peer evaluation (M = 2.95) were less important.

Self-evaluation (M = 3.03), teacher evaluation (M = 2.78) and product-oriented evaluation (M = 2.76) were mostly rated as evaluation procedures students wanted to be frequently used in the class. They believed that individual project-based evaluation (M = 2.66), process-oriented evaluation (M = 2.63), group project-based evaluation (M = 2.63), portfolio assessment (M = 2.14) and peer evaluation (M = 2.11) should be rarely used.

Students' Attitudes toward the Course

Most of the students believed that the course should be taken at all levels, but especially during the last semester of their undergraduate program. One of the students, in this regard, claimed that, "it would be more effective to take this course when I am approaching to be a teacher (student 31)." Another student supported this idea by stating that, "to me, offering this course in fourth class will be practical to apply our skills gained through the course to our teaching profession (student 35)." On the other hand, some students indicated that it would be more meaningful when the course is offered to each grade level because "the tree has bended down when it is young (student 83)." This idea was supported by the students coming from lower levels (2nd and 3rd level of students). Some students reported that the course should be offered as a must rather than elective.

Nearly all students thought that taking this course would contribute various benefits to their own profession (whether as a teacher, engineer – mine, food, geology, and civil or economist…etc) and their daily life. They tended to use and apply their theoretical knowledge and experiences regarding the environment to their profession. They expected to see the reflections of this course in the professional life. For example, students indicated that they could be a model to other individuals in terms of positive attitude and responsible behavior toward the environment. Students who will become teachers believed that they would instill environmental sensitivity, awareness and consciousness to their students, and would share their own knowledge about the environment with their students. As it was clear from their responses, all the students would share their experiences related to environment with their employees, students, peers and colleagues when they start their profession. In this sense, one student from engineering department mentioned that, "as an engineer, I would give more importance to the treatment facilities of a factory, and I would also help the workers become knowledgeable about the environment" (Student 15). As asserted by some, they would like to attend decision making process and make some changes in environmental related laws. Some claimed that since the course was interdisciplinary in nature, the information discussed during the course might be adaptable to all professions. For example, a student from the Department of Business Administration said that "[This course will contribute to me by helping] use our resources more effectively" (Student 54). The other student from department of math education reported, "I used to think that mathematics was not related [with the environment]. However, I am now thinking

to mention something related to this subject [environment] to my students" (Student 85).

In addition to contributions to their own professional life, students also believed that there were some contributions and benefit of this course to their own daily lives. For example, this course provided a new point of view by helping develop new habits, environmental awareness, sensitivity and consciousness, respect to the environment, and also to remind them of their responsibility, their influences on environment and the importance of sustainability. One student promised that, "I would be more careful in diminishing the footprint that I have left in the nature" (Student 4). Furthermore, students indicated that the course would help develop environmentally friendly behaviors, create sensitive consumers, help diminish an environmental footprint in nature and motivate to take action for preventing and protecting environmental problems. In this sense, student 46 indicated that "[this course contributed to me] thinking always about environment and natural sources, and remembering that this world is left me to look after." The students started to use natural sources more careful and develop the notion of sustainable use of natural sources. In this respect, one of the students indicated that "I do not leave the fountain open any more when I am brushing my teeth" (Student 68). This course also enabled them to control their own consumption habits. Student 66 mentioned his new consumption habit and indicated, "I am not drinking canned beverages any more. I am using less detergent, toothbrush and water. I am using unleaded oil." What student 15 said seemed to summarize most of the students' views; "[this course contributes to] being more sensitive individual to (the environment) and looking the problems and issues from more broad framework."

Conclusion and Discussion

This needs assessment (NA) study was undertaken with 85 undergraduate students from various departments to assess their needs and expectation from the course "Education and Awareness for Sustainability," which introduces the terms of education, awareness and sustainability together. The NA was an initial step of course evaluation assessing the total quality of course implementation. Students' expectations from the course varied according to their subjects and departments, and their needs were more based on their life habits and professional orientations. The students believed in a strong association among the terms of education,

awareness and sustainability. Their definitions of these terms referred that sustainability could not be fully understood and realized without education and awareness of the natural environment. The significant role of education for sustainability was initially stressed in Brundtlant Report (1987), one of the attempts to identify education-sustainable development relationship. In this regard, education plays a crucially important role for motivating people to show more sustainable lifestyle and behave more sustainable, and also to help communities understand the principles of sustainable development. Ciegis and Gineitienè (2006) claimed that higher education institutions, particularly universities, have a leadership role for teaching, learning and research on sustainability and should rise to meet the challenges of sustainable development in the society. Furthermore, in order to realize this role, the universities should integrate the sustainability issues in their programs (Cortese, 1999) through considering multidisciplinary and interdisciplinary approaches (Martins, Mata, & Costa, 2006) since sustainability is regarded with several other subjects, i.e. technical and scientific areas (Crofton, 2000). The course Education and Awareness for Sustainability in the curriculum of Science Education Department in METU is one good example of this integration. Dissemination of this integration into other universities may take time. As discussed by Velazquez, Munguia and Sanchez (2005), education for sustainable development is a continuous process which will take place in the agenda of many universities, but this process may not be as quick as possible due to insufficient conditions of campuses.

The students in the study identified the terms of education, awareness and sustainability and interactions among these concepts, as well as their expectations from the course and the course instructor. In addition, desired instructional methods and techniques, materials and equipment and evaluation procedures were also indicated by the students. Most of the students' main purpose for enrolling in this course was to learn how to integrate a sustainable way of life into their profession as well as daily life. It is interesting and encouraging to find out that they felt a need to learn how to be a partner in realizing the sustainable development and they were aware of their responsibility as future educators, engineers or decision makers. Nearly all of them indicated that they would like to learn how to deal with environmental problems, how to develop environmentally responsible behaviors, how to teach the environmental issues and problems to their students, and how to inform the individuals about the environment. This is evidence that the students would like to come up with their own solutions for a sustainable way of life and

integrate this notion into their life experiences. This course, in this sense, could be a mean to link between theory and practice, and also serve as a bridge between the classroom and real life experiences. When students' needs are more integrated in course content and implementation, the possibility to realize this link will be more likely to increase.

The results basically proved that the more the students' needs are integrated into the course implementation, the more the students feel attached to the course and the more they feel responsible for their own learning process. As far as students' expectation regarding course implementation was concerned, it was observed that they described a constructive learning environment. They reported an active role of students and a guiding role of teachers in the class activities. Based upon the students' responses, it can be recognized that the best instructional methods to increase the awareness for sustainability were discussion and brainstorming; the best instructional materials were computer and projection machines, visual materials – i.e. posters, video and TV; and the best evaluation methods were teacher-evaluation, self-evaluation and product-oriented evaluation methods. Using different types of instructional methods and techniques, and also instructional media, can help the students look at the concept of sustainability from different point of view. The method of discussion and brainstorming were required to be frequently used within the class activities. Both of these methods encourage high level participation in class activities and require higher order thinking skills (Ornstein & Lasley, 2004). This can be tied to students' willingness to share their own ideas with their peers and to come up with common solutions for a sustainable way of life. Furthermore, the students required the instructor to use visual equipment (i.e., computer, video) to be aware of the example of environmental problems and issues encountered in local and global communities. It is well known that using a variety of visual material in course implementation can enhance the learning and make it long lasting (Demirel, 1995; Kaya & Demirel, 2000). In addition, students would like to be evaluated through the methods of teacher evaluation, self-evaluation and product-oriented evaluation. This result showed that the students would like to be evaluated based on their products, and not only teacher judgment, but also their own judgments on their products are valued. Peer evaluation, portfolio evaluation and other methods were not that much appreciated. Encouraging students to be responsible of their own products through evaluation can contribute to both the instructor and the students. For example, students can see their learning difficulties and monitor their own progress. Furthermore, the

possibility to make fair judgments by teacher can increase through self-evaluation (i.e., reflections) and teacher evaluation will almost complement each other.

Suggestions

Several implications can be drawn from the study. They can basically be categorized into two categories, research-related implications and educational-related implications. The results of the summative evaluation performed at the end of course evaluation should be compared with the NA results so as to determine whether the students' needs were satisfied with course implementation. If any gap is found, the system should be re-started or revised in order to fill this gap. In this way, most of the educational needs of the learner will be met. This study was only conducted with the students taking the EAfS course. The other stakeholders' views (i.e., instructors, school principals and community organizations) on the course can also be taken to enhance the quality of the course.

Since this course has been offered as two sections, an experimental study designed as a pre-test post-test control should be undertaken to observe the possible effects of different types of instructional methods and techniques on students' understanding of sustainability. Not only short-term but also long-term effects of this course should be determined through developing a tracking program for the students.

Learners can show more responsibility for their learning process when their needs are more or less integrated into course implementation. This study, in this sense, appears to be a good example which shows how to analyze and assess students' needs for course development and evaluation. Thus, the model and the questionnaire developed in the study can be used in other needs assessment studies. Furthermore, students' needs that emerged here can guide other instructors who will plan to develop and evaluate similar course(s) on sustainability in higher education.

It is clear from the results of this needs assessment study that the EAfS course and similar courses can develop individuals' sense of responsibility for and motivation to take sustainable actions. Many people in the higher education institutions have started to consider the sustainability as a key for education for sustainable development (Velazquez et al., 2005) with the last decade dedicated to Education

for Sustainable Development during 2005-2012 by UNESCO (UNESCO-CONNECT, 2005). However, higher education institutions, which have a central role for shaping the community, are still at level of infancy in order to be a sustainable, due mainly to lack of sustainability policies and lack of awareness of the university communities. In this sense, in order to keep up with recent changes, as a result of the decade for Education for Sustainable Development, universities should integrate the sustainability issues into their policy and their programs. Seminar programs, courses and joint projects may help facilitate this process.

References

Akpinar, N., & Paykoç, F. (2004). Needs of future faculty members in relation to instructional planning, effective teaching and evaluation: A case study. *Egitim ve Bilim-Education & Science, 29* (133), 71-82.

Bruntland, G. (1987). *Our Common Future: The World Commission on Environment and Development*. Oxford, UK: Oxford University Press.

Ciegis, R.& Gineitienè, D. (2006). The role of universities in promoting sustainability. *Engineering Economics, 3* (48), 56-62.

Cook, S. (2005). Learning needs analysis part 4: Planning the learning needs analysis project. *Training Journal, Business module*, 54-58.

Cortese, A. (1999). Education for sustainability: The university as a model of sustainability. Retrieved on May 1st, 2009 from http://www.secondnature.org/pdf/snwritings/articles/univmodel.pdf.

Crofton, F. S (2000). Educating for sustainability: Opportunities in undergraduate engineering. *Journal of Cleaner Production, 8*, 397-405.

de Ciurana, A.M.G., Filho, W.L. (2006). Education for sustainability in university studies: Experiences from project involving European and Latin American universities. *International Journal of Sustainability in Higher Education, 7* (1), 81-93.

Demirel, Ö. (1995). *Genel ögretim yöntenleri*. Ankara: USEM Yayinlari.

dé Rebello, D. (2003). Shaping the practical role of higher education for a sustainable development. A paper presented at *International Conference on Education for a Sustainable Future*. Charles University, Karolinum, Prague, Czech Republic, 10 – 11 September. Retrieved on October 08, 2006 from http://www.unesco.org/iau/sd/pdf/Rebello.pdf.

Herremans, I.M., & Reid, R.E. (2002). Developing awareness of the sustainability concept. *Journal of Environmental Education, 34* (1), 16-20.

Joint Committee on Standards for Educational Evaluation (1994). *Standards for evaluations of educational programs projects and materials*. Donneley & Sons Company.

Kaya, Z. & Demirel, Ö. (2000). *Ilkögretim basamagindaki Türkçe programlarinin medya materyal gereksinimi*. In Z. Gökçalan (Ed.) VIII. Ulusal Egitim Bilimleri Kongresi, Bilimsel Çalismalari, 512-521, Trabzon.

Martins, A.A., Mata, T.M., & Costa, C.A.V. (2006). Education for sustainability: Challenges and trends. *Clean Technologies and Environmental Policy, 8*, 31-37.

Moore, J. (2005). Seven recommendations for creating sustainability education in university level: A guide for change agents. *International Journal of Sustainability in Higher Education, 6* (4), 326-339.

Ornstein, A.C. & Lasley, A.C., (2004). *Strategies for Effective Teaching*. New York: The McGraw-Hill Companies.

Önkol, P., Tan, G., Erdogan, M., & Misirli, A. (2005). TQM: a need or a must? In Nikos P. Terzis (Ed.), *Quality in Education in the Balkans*: Vol. 5. (pp. 413-435). Greece: Publishing House Kyriakidis Brothers s.a.

Palmer, J.A. (1997). Beyond science: Global imperatives for environmental education in the 21st century. In Patricia J. Thompson (Ed), *Environmental Education for the 21st Century*. The United States of America: Peter Lang Publishing.

Stufflebeam, D.L. (2003). The CIPP model for evaluation. A paper presented at the 2003 Annual Conference of the Oregon Program Evaluators Network (OPEN), Mart 10, 2003, Portland, Oregon. Retrieved on September 11, 2006 from http://www.wmich.edu/evalctr/pubs/CIPP-ModelOregon10-03.pdf#search=%22CIPP%20Model%22.

Stufflebeam, D.L., McCormick, C.H, Brinkerhoff, R.O., Nelson, C.O. (1984). *Conducting Educational Needs Assessments*. Massachusetts: Kluwer Academic Publishers.

UNESCO-CONNECT (2005). International implementation scheme for the UN decade of education for sustainable development (2005-2014). *UNESCO International Science, Technology & Environmental Education Newsletter, 30* (1-2).

UNESCO (1997). International conference environment and society: Education and public awareness for sustainability; Declaration of Thessaloniki. Retrieved on October 02, 2006 from http://ncseonline.org/ncseconference/2003conference/thessaloniki_declaration.pdf.

Velazquez, L., Munguia, N. & Sanchez, M. (2005). Deterring sustainability in higher education institutions: An appraisal of the factors which influence sustainability in higher education institutions. *International Journal of Sustainability in Higher Education, 6* (4), 383-391.

Witkin, B. R., & Altschuld, J. W. (1995). *Planning and Conducting Needs Assessment: A Practical Guide*. Thousand Oaks, CA: Sage.

Wright, T.S.A. (2002). Definitions and frameworks for environmental sustainability in higher education. *International Journal of Sustainability in Higher Education, 3* (3), 203-220.