

Teachers' Views about Science and Technology Lesson Effects on the Development of Students' Entrepreneurship Skills

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Abstract

The purpose of this study was to determine the views of science and technology teachers about the effects of 6th, 7th and 8th grade science and technology courses on students' entrepreneurship skills. In the study, phenomenographic method was used and data were collected through a semi-structured interview method with 8 questions. 5 science and technology teachers, who were working in the province of Amasya, participated in this research. The obtained data were analyzed with the NVIVO 9 software. Based on data analysis, it was concluded that teachers did not have enough knowledge about entrepreneurship concept, so that they had different understanding and practices to gain their students the entrepreneurial skills. However, it was identified that teachers having a common vision about student-centered teaching methods and techniques were effective in developing entrepreneurial skills. At the end of the study, to develop a collective mentality about entrepreneurship skills, it was recommended to the teachers that class meetings should be made more functional and more studies should be required for the dissemination of good practices.

Key Words

Entrepreneurial Skills, Science and Technology Course, Science and Technology Teacher.

In our age, a human model is needed that a person who knows ways of attaining knowledge and learning to learn rather than a person who knows everything (Numanoğlu, 1999). The main purpose of the educational systems is to educate creative and innovative humans (Çalık & Sezgin, 2005), and also, it is expected that all these educational systems prepare the individual for the information society and make him an outstanding member of

the society (Kültekin, 2006). For this purpose, the new primary curriculum was introduced in our country in 2004.

Renewed primary curriculum, with a student centered approach, adopting a constructivist approach, aims to improve students skills in; critical thinking, creative thinking, communication, research and inquiry, problem solving, using information technologies, entrepreneurship and using Turkish right, effective and beautiful (Milli Eğitim Bakanlığı [MEB], 2005), and give students opportunities to learn by doing and experiencing (Bacanak, 2008; Erdoğan, 2005; Kırıkkaya, 2009).

In daily life, enterprise is used to express the state to take action to do a job, and entrepreneur is used to mean go-getter who involved in such situation. In fact, these concepts are discussed in an economic frame (Aytaç & İlhan, 2007). The "entrepreneurship" phenomena and "entrepreneurial culture" phenomena, which is developed in parallel with these concepts, are one of the issues which should

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be emphasized, especially in recent years (Eraslan, 2011).

Çarıkçı and Koyuncu (2010), describe an enterprising individual as a person who aims to resolve the need to respect by removing societal needs after performing requirements such physiological, security, belonging and love. Ministry of Education (2005) describes the entrepreneurship "... *empathy, to show consistent behavior at human relationships, planning, implement plans, risk-taking, detection of a product need that may be needed in any field...*"

Some basic skills in entrepreneurship can be developed through training. Iredale and Motsa (2002, p. 1 as cited in Gömleksiz & Kan, 2007) listed these skills as; problem solving, creativity, persuasion, planning, accurate decision making, self-trust, autonomy, self-sufficiency, achievement orientation, being versatile, resourceful and dynamic. On the other hand, Eraslan (2011) has listed the basic skills which an entrepreneur individual should have as following:

- She/he should be open for innovation, and create interesting ideas and thoughts to profitable activity domains.
- She/he boldly take on risks that can occur or may occur against the challenges of different and unusual events, and must have knowledge and skills of risk management.
- She/he is a leader in sustaining the process of entrepreneurship and in the development of innovation.
- Entrepreneurship is a project management planned and based on research.

Hisrich and Peters (2001) describe an entrepreneur as a person who combines labor, raw materials and other assets to create a greater value/allow. According to Naffziger (1995), who describes entrepreneurship according to the behavioral approach, entrepreneurship is a behavioral process of interaction of many factors other than personality. Other researchers working in the behavioral approach reported entrepreneurs are special people and they carry personal characteristics that others do not have (Yelkikalan, 2006). So the qualities of entrepreneurs are as follows (Döm, 2006, pp. 8-9): i) to make a commitment, ii) The presence of an actuating motive, iii) To be determined, iv) To be resistant, v) Goal-oriented, vi) To take the initiative, vii) To act flexible, viii) To solve problem, ix) To act from reality, x) To use feedback, xi) To have self-control, xii) To take on risk, xiii) To be prudent,

xiv) Result orientated, xv) Reassurance, reliability.

Sociologists, who explain entrepreneurship as a sociological base, state that social factors such as social environment, family origin, education, age, gender, race is effective in the development of entrepreneurial skills (Aytaç & İlhan, 2007). Accordingly, entrepreneurship may occur in the presence of some features at individual, and also may develop from the affection some factors such as education and environment.

It is a fact that the entrepreneur individuals are entrepreneur in their students' lives, business lives and social situations. For this reason, the process of developing entrepreneurial skills can also be supported with extracurricular activities, not just classroom activities (Eraslan, 2011). Polat and Aktop (2010) report that the family, the environment and education are having an effect on the formation of the entrepreneurial personality. Accordingly Erdoğan (2000), entrepreneurship is a skill that should be heeded because individuals with the entrepreneurial personality can transform seemingly trivial situations as an opportunity.

When the literature is reviewed, there are a large number of studies, especially on entrepreneurship education (Finkle, 2007; Finkle & Deeds, 2001; Finkle, Kuratko, & Goldsby, 2006; Katz, 2003; Solomon, 2007; Solomon, Duffy, & Tarabishy, 2002; Zahra, Sapienza, & Davidsson, 2006). When the literature in our country is reviewed, there is too much work on skills that need to bring students in primary education, especially thinking skills (Akar, 2007; Baykara, 2006; Çelikkaya, 2011; Gömleksiz & Kan, 2007, 2009; Hazır & Türkmen, 2008; Hotaman, 2008; Öcal, 2007; Özdemir, 2006; Seferoğlu & Akbıyık, 2006; Üstünoğlu, 2006; Tan & Temiz, 2003; Yağcı, 2005). In spite of this, it is possible to encounter some studies about entrepreneurial skills in the literature (Arslantaş, 2001; Aytaç, 2006; Aytaç & İlhan, 2007; Baysal & Özkul, 2009; Eraslan, 2011; Gözek, 2003; Gülhan, 2003), but not regarding the effect of science and technology course on entrepreneurial skills.

Purpose

The purpose of this study was to determine the views of science and technology teachers about the effects of 6th, 7th and 8th grade science and technology courses on students' entrepreneurship skills.

Method

Research Model

In the study, phenomena-graphic method was used. Phenomena-graphic method is an appropriate design for studies which require to research the facts that we are aware, but not be able to comprehend the meaning of them completely, and do not have a deep and detailed understanding. Phenomena-graphic studies do not bring definite and generalization results as other qualitative research methods do, but can bring samples, explanations, and lives to help understanding and have better acknowledgement about the investigated fact.

Sample Group

The sample included 5 science and technology teachers, who were working in the province of Amasya in 2011-2012 academic years and coded with A, B, C, D, E letters.

Data Collection Instrument

In the study, data were gathered by the help of a semi-structured interview form including eight open-ended questions. Each interview took average 30 minutes.

Data Analysis

In phenomenographic method, while analyzing the obtained data, the researcher created the categories based on the similarities and differences between individuals expressions involved in the study. Each category revealed that how different individuals perceived and experienced different concepts. This method is based on that limited number of category will be obtained for each concept and these categories will be created by analyzing the collected data (Didiş, Özcan, & Abak, 2008).

In this study, the content analysis method was used to reveal the concepts underlying the data and the relationships between these concepts. It is recommended to follow a specific sequence of operations for the content analysis (Kishore, Agrawal, & Rao, 2005).

NVIVO 9 was also used in order to analyze and design the research data (Cassell, Buehring, Symon, Johnson, & Bishop, 2005). For this study, Cohen's kappa coefficient (Bacanak, 2008; Boyacıoğlu & Güneri, 2006) was calculated 0.84 and in terms of data analysis, the reliability (Dawson-Saunders & Trap, 1994) was provided.

Findings

The findings of the research were as follows:

1- A coded teacher's thoughts about the concept of entrepreneurship were coded with the codes of *taking duties and responsibilities, self-expression, not being shy, not to be insensitive, and leadership qualities*. B coded teacher's thoughts about the concept of entrepreneurship with the codes of *self-expression, to provide concrete information, good communication skills and ask questions*.

2- B-coded and C-coded teacher emphasized the *self-expression* code more, E-coded teacher emphasized *willing* code more.

3- All teachers stated that the school, the environment and the family were effective in bringing entrepreneurship. In particular, because of the importance of building personality and perspective on life, D-coded teacher emphasized the importance of the family in gaining the entrepreneurial skills. But, the other teachers in the study group stated that the school was more effective in gaining entrepreneurial skills.

4- E-coded teacher emphasized the importance of the game method in gaining entrepreneurial skills.

5- A-coded teacher stated that physics units were more important in gaining entrepreneurial skills.

6- The study group teachers emphasized that teachers' personality and occupational characteristics may have importance for the student to gain entrepreneurship skills. However, A, D, and E-coded teachers regarded themselves as less entrepreneurial individuals teachers, B and C-coded teachers regarded themselves as entrepreneurial individuals.

7- All teachers in the study group expressed that teachers entrepreneurial skills are effective in improving students' entrepreneurial skills.

8- On the effects of school administrators and other teachers in the development of students' entrepreneurial skills, A-coded teacher reported that the opinion was not effective, but the other teachers reported that the opinion was effective.

Discussion and Results

"... The teacher; creates desired behavioral changes, it gives a good relationship and makes him capable. Also, save the sense of the current value and roles such as judgeship, confidence to student are also expected from a teacher. Teachers need to believe in the general principles and objectives of the educa-

tional process, and need to have compassion for the development of individual initiative and creativity. Each element of the training knotted and valued by the teacher." (Gürses, Doğar, Yalçın, Açıkyıldız, & Bayrak, 2005, p. 2). It is important for the teachers to know and define and even to have the knowledge and skills that the students should gain. However, it is emerged as a result in this study that the teachers do not exactly know the features of an entrepreneur individual.

According to Çarıkcı and Koyuncu (2010), there are three key elements in the basis of entrepreneurship: bringing innovation, risk-taking and proactive. Börü (2006) determines that the proactive element of entrepreneurship requires to be ambitious, willing and compatible. In his study, Döm (2006) counts ambitious and durable between the characteristics of an entrepreneur individuals. In this study, teachers mentioned the features such as fighting spirit and willingness at the definition of the concept of entrepreneurship. This result is consistent with descriptions of Döm (2006) and Börü (2006).

Çarıkcı and Koyuncu (2010) state that the number of entrepreneurs is more with an emphasis on individualism in society. In this study, teachers refer to socialization not individualism. This situation appears to be a violation of the individualism property of entrepreneurship. Teachers' perception of an entrepreneurial individual as a person who is good at communicating with social surroundings, have a high socializing characteristic and not shy, due to society's perception of entrepreneurs. Because it is known that Turkish society have a culture that act jointly (Çelik, 2001; Sargut, 2001) and the cultures are extremely effective on entrepreneurial.

In several literature studies (Bacanak, 2008; Bingölbali, Özmantar, & Akkoç, 2008; Bulut, 2007; Özmantar, Bingölbali & Akkoç, 2008; Toptaş, 2006) it is expressed that teachers have difficulties in understanding the nature and practice of the renewed curriculum. The findings of this study show that teachers do not know the nature of entrepreneurship skills exactly. In this context, we can say that teachers live in difficulties in the preparation of the appropriate environment which provides opportunities to students to develop entrepreneurial skills.

Kuratko and Hodgets (1998) identify that the factors affect the entrepreneurial process as personal, social, environmental, and organizational factors. Eraslan (2011) emphasizes that entrepreneurship skills are not only developed by the effects of environmental impact but training, school and teachers

should have supportive effects. In this study, when the teachers' views on the factors that are effective in developing entrepreneurial skills are analyzed, encodings are collected under three themes as the school, the environment and the family.

In this study, however, teachers express the importance of contribution of the family to the development of personality, and also stated that school is important for discovering the features such as the leadership. Köse (2004) states that school is effective in the development of the leadership property. According to Köse extra-curricular activities are effective in uncovering and development of leadership skills and extra-curricular activities must be under the control of the school. Also, Hesapçıoğlu (1994) states that the extra-curricular activities are effective in gaining the behavior such as cooperation, competition, responsibility, work, achievement, to be tolerant etc.

Giddens (2000) reports that institutions such as school and family that make up the social structure affect the development of an individual's personality by creating a variety of patterns of behavior. Jahoda (1993) states that effect of the family to the development of the personality is much more important than other social institutions. Also, in this study, teachers emphasized that family helps the students to develop their life views which they have as well as formation of their self-esteem and personality.

De Pillis (1998) emphasizes that the evaluation of entrepreneurs with only personal characteristics will not be consistent from time to time, also, need to take socio-cultural variables into consideration (as cited in Akşit, 2003). Ersoy (2010) states that a wide variety of environmental conditions affects the preferences of individual entrepreneurship. For this reason, it can be said as a result that the environment that students are in, and the conditions and cultural values of this environment are important in the development of student skills of entrepreneurs.

There are also so abstract concepts as much as concrete concepts between the concepts of science and technology and for meaningful learning, first, the concretization of abstract concepts should be required (Kaptan & Arslan, 2002). To do this, methods and techniques that facilitate learning should be utilized in science and technology courses. In the study group, science and technology teachers state that the most appropriate methods to develop entrepreneurial skills are the experimental method and question-answer method. The experimental

method can include observation, laboratory and demonstration techniques (Hesapçıoğlu, 1994; Karakuş, 2007). The experimental method also allows individual work as well as the study group. The individuality is extremely important in the development of entrepreneurship skills (Çarıkcı & Koyuncu, 2010). Karakuş (2006; 2007) stated that using the experimental method in teaching would be helpful to develop self-confidence, to work independently, to the development of problem solving skills, and to increase analytical thinking skills. Also, Shulman and Tamir (1973) emphasize that the use of the experimental method would be useful in the development of the attitudes such as interests, risk-taking, trust stressed; the skills such as research, invention, organizational and communication, and the cognitive abilities such as critical thinking, problem solving, analysis, synthesis.

Question-and-answer method is one of the oldest teaching methods that is very useful for students to gain habits of thinking and speech, and often referred to use teaching of each course (Kaptan & Arslan, 2002). According to Kaptan (1999), the teacher, in question and answer technique, should take a skeptical attitude to the responses and should be asked to the other students with reasons whether the answer is correct so that students can be shipped to critical thinking. According to Aydın (2001), also, the question and answer method has a purpose and functions such as to create an environment that encourages constructive and productive thinking, to arouse interest, to stimulate analytical thinking, and to assess the new values and attitudes. As a result, it could be reached that taken into account in terms of its common use as a method in education with its purposes and functions, question and answer method is the most common method which can be used in the development of entrepreneurial skills.

The study group teachers' expressions about the methods and techniques that can be used in the development of entrepreneurial skills such as cooperative learning, games, brainstorming, invention, animation, drama, interviews and debates, are student-centered methods and techniques. When student-centered methods and techniques are used, the students take an active role in the learning process, therefore a more permanent and meaningful learning are carried out. According to active learning theory, students have the feelings such as self-confidence, self-regulatory, social and become aware (Harmin & Toth, 2006). Korkmaz (2007) notes that student-centered teaching strategies help students

to develop self-confidence, to gain thinking skills, to express what they think, and to learn to be tolerant and respectful towards different thoughts. Gibb (2002) and Sogunro (2004) express that traditional teaching methods are less effective in teaching entrepreneurship. For this reason, we can say that student-centered methods and techniques may assist in the development of many features and can be used in defining entrepreneurial individual, such as self-esteem to be sensitive to the problems, finding solutions, creative thinking, and taking responsibility of individual and group studies.

Teachers, who adopt student-centered teaching methods and techniques, develop a higher level of mental development and a more positive personality traits in their students than teachers who adopt teacher-centered teaching methods and techniques (Erkan, 1999; Kılıççı 1992). According to this, we can achieve that the study group teachers use the appropriate methods and techniques to develop entrepreneurial skills.

Project-based learning method develops entrepreneurship such as taking responsibility, creative thinking, and the individual thinking skills (Bağcı, İlik, Sünbül, Yağız, & Afyon, 2005; Binbaşıoğlu, 2003). It is understood that the study group teachers preferred to use many student-centered methods and techniques, but they did not prefer to use the project-based learning method.

Teachers in the study group, believe that the entrepreneurial characteristics of science and technology teachers affect the students' entrepreneurial skills positively, but they have different views about the impact of the entrepreneurial characteristics of other teachers or school administrators on students. The teacher influences the students with his knowledge, skills and attitudes as well as his behavior while training his students (Deniz, 2005).

Teacher's appearance, speech, behavior, believability can affect the students (Bilen, 2004), so teachers should wear appropriate clothing, his speech must be credible and realistic, and must be a person who work diligently and consistent with his behaviors. According to Kılıççı (1992), the students whose teacher treats them with respect, sincerity, and empathy are become productive, creative, researcher and entrepreneurs. In this context, as a result it can be said that the teacher professional features that include the approach to the students and personal characteristics such as entrepreneurship skills that can be an example to the students are very important in the development of students' entrepreneurship skills.

Suggestions

The following suggestions are made for science and technology teachers to develop the entrepreneurial skills of students.

- It is understood that science and technology teachers do not know the characteristics of an entrepreneur. For this reason, the concept of entrepreneurship skill and an entrepreneurial individual features should be introduced to the teachers with in-service courses or seminars.
- Consultations about entrepreneurial skills of students should be included into the meetings of teachers.
- Science and technology teachers should pay attention to the use of student-centered teaching methods and techniques which increase students' entrepreneurial skills such as experiment, projects, and drama at teaching-learning process.
- Students may take their teachers as a role model, especially at primary level. For this reason, entrepreneurial skill levels of teachers should be investigated.
- School administrators and teachers should create opportunities to showcase students' entrepreneurial skills and other students should be encouraged by supporting entrepreneur students.
- The similar studies about entrepreneurship skills should be extended in all levels of primary school, and must be repeated to a variety of larger sample groups.

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