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Fen Bilimleri Ders Kitaplarında Yer Alan Etkinliklerin Girişimcilik Bağlamından İncelenmesi*

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ÖZET

Millî Eğitim Bakanlığı, 2013-2014 eğitim öğretim yılı itibariyle Fen Bilimleri Dersi Öğretim Programında yaşam becerileri altında girişimcilik kavramına yer vermiştir. Girişimcilik kavramının yer almasıyla birlikte, ders kitaplarında yer alan etkinliklerin girişimcilik kavramı açısından öğretmen görüşleri doğrultusunda incelenmesinin önemli hale geldiği söylenebilir. Bu bağlamda yapılan bu çalışmanın amacı, fen bilimleri ders kitabında yer alan etkinliklerin girişimcilik kavramına uygunluğu ile ilgili öğretmen görüşünü almaktır. Çalışma, nitel araştırma yaklaşımından tasarlanmıştır. Çalışma, Van il merkezinde farklı ortaokullarda görev yapan 10 fen bilimleri öğretmenin gönüllü katılımı ile gerçekleştirilmiştir. Araştırmada veri toplama aracı olarak yarı yapılandırılmış görüşme formu kullanılmıştır. Elde edilen veriler içerik ve betimsel analiz kapsamında değerlendirilmiştir. Çalışmaya katılan Fen Bilimleri öğretmenlerinin yarısından fazlası etkinliklerin öğrencilerin girişimcilik becerisini geliştirme yeterliliğine sahip olduğunu ifade ederken, diğer kısmı ise yetersiz olduğunu ifade etmişlerdir. Ayrıca öğretmenler fizik ve biyoloji konuları ile ilgili etkinliklerin öğrencilerin girişimcilik becerisine daha fazla katkı sağlayacaklarını, kimya konuları ile ilgili etkinliklerin ise öğrencilerin girişimcilik becerileri üzerinde etkisinin daha az olacağını ifade etmişlerdir. Çalışmanın etkililiğinin ortaya çıkması için araştırmacıların farklı zamanlarda daha geniş katılımlı çalışma yapmaları önerilmektedir.

Anahtar Kelimeler: Fen bilimleri öğretmeni, fen bilimleri dersi, girişimcilik, etkinlikler

Geniş Özet

Amaç

Yapılandırmacı öğrenme kuramı kapsamında çocuğun öğrendiği yeni bilgiyi eski bilgileri ile harmanlayıp doğru şemaya yerleştirmesi beklenmektedir. Bu sürece aktif olarak dahil olması ve yeni fikirler üretmesi, kazandırılması gereken hedefler arasında yer almaktadır. Yapılandırmacı öğrenme kuramı ile hedeflenen kazanımlar incelendiğinde girişimci bireyin özellikleri ile örtüştüğü görülmektedir (Deveci, 2016). Girişimcilik kavramının programda yer alması ile birlikte, fen bilimleri ders kitabında yer alan etkinliklerin öğrencilere girişimci özellik

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kazandırma durumunun öğretmen görüşleri doğrultusundan sorgulanması gerektiğine inanılmaktadır. Öğretmenlerin derslerde öğrencilere rehberlik eden kişiler olması, öğretim programlarını uygulayıcıları olmaları, ders kitaplarında yer alan etkinliklerin öğrencilere girişimci birey özelliği kazandırması nedeniyle öğretmenlerin görüşleri önem arz etmektedir. Ders kitapları öğretim programları dikkate alınarak yazılmaktadır. Bu bağlamda, ders kitaplarında yer alan etkinliklerin öğretmen görüşleri doğrultusunda araştırılması bu çalışmayı önemli kılmaktadır. Dolaysıyla; bu çalışmanın amacı, fen bilimleri ders kitabında yer alan etkinliklerin girişimcilik becerisine uygunluğu ile ilgili öğretmen görüşünü almaktır.

Yöntem

Bu çalışmada, nitel araştırma yaklaşımlarından özel durum yöntemi kullanılmıştır. Fen bilimleri öğretmenlerinin ders kitabında yer alan etkinliklerin girişimcilik kapsamında değerlendirmeleri, sınırlı sayıda öğretmen ile yürütülmesi ve elde edilen verilerin genelleme kaygısının olmaması nedeniyle bu çalışmada özel durum yöntemi tercih edilmiştir. Bu çalışma, 2016-2017 eğitim öğretim yılı güz döneminde Van ilinde farklı okullarda görev yapmakta ve araştırmaya katılmakta gönüllü olan 10 Fen Bilimleri öğretmeni ile yürütülmüştür. Araştırmanının inanılırlığı, araştırmacı üçgenlemesi ve uzman incelemesi ile sağlanmıştır. Elde edilen veriler, üç araştırmacının farklı zamanlarda değerlendirilmesi ile gerçekleşmiştir. Araştırmanın aktarılabilirliğinin sağlanabilmesi için amaçlı örneklem tercih edilmiş ve araştırma süreci okuyucuya detaylı olarak açıklanmıştır. Doğrulanabilirlik için, işlenmemiş veriler, bulgular, yorum ve öneriler kayıt altına alınarak birçok defa incelenmiştir. Aynı zamanda katılımcılara mülakatta elde edilen veriler teyit ettirilmiştir. Bu çalışmada veriler, yarı yapılandırılmış mülakat ile toplanmıştır. Mülakat verilerinin analizinde içerik ve betimsel analiz kullanılmıştır.

Bulgular

Tablo 3 incelendiğinde, katılımcıların ikinci soruya “Yeterli” teması altında; günlük hayatla ilişkili etkinliklerin olması, yeterince düşündürücü soruların olması, yaratıcı düşünmeyi sağlamada yeterli olması ve eleştirel düşünmeye odaklanma gibi kodlar ile cevap verdikleri görülmektedir. Bu konuda $Ö_1$ rumuzlu öğretmen; *“Etkinlerin yeterince olduğunu düşünüyorum. Bu etkinliklerin çoğunun günlük hayatta ilişkili olarak hazırlanması, öğrencilerin girişimcilik becerisi sağlamada katkı sağlayacak diye düşünüyorum.”* şeklinde görüş bildirmiştir. Ayrıca $Ö_4$ rumuzlu öğretmen ise, *“Her kademede etkinliklere genel anlamda bakıldığında yaratıcı düşünmeyi, eleştirel düşünmeyi ve düşündürücü soruların yer aldığı görülmektedir. Etkinliklerin büyük çoğunluğu öğrenciyi düşündüren ve araştırma yapmaya yönelten sorular ile donatılmış olması öğrencileri girişimciliğe yöneltecektir.”* şeklinde fikir beyan etmiştir. Katılımcıların bazıları ise etkinliklerin girişimcilik açısından “Yetersiz” olduğu görüşünde birleşmişlerdir. Katılımcılar bu görüşlerini; kapalı uçlu deneylerin, ispatlamaya yönelik deneylerin ve açık uçlu

deneylerin ders kitabında az olduğunu dile getirmişlerdir. Bu konuda $Ö_{10}$ rumuzlu öğretmen; "*Etkinliklerin büyük çoğunluğu açık uçlu deneyler şeklinde olmaması ve daha çok ders kitabındaki bilgileri doğrulamaya yönelik olduğu için öğrencilere girişimcilik becerisini kazandırmada yetersiz olduğunu düşünüyorum."* şeklinde düşüncesini ortaya koymuştur. Çalışmaya katılan öğretmenlerin bazıları ise görüşlerini açık uçlu deneylerin ve hipotez test etme deneylerin azlığı kodları ile görüş bildirmişlerdir. Bu şekilde düşüncesini açıklayan $Ö_7$ rumuzlu öğretmen, *"Ders kitabında yer alan deneyleri etkinlik olarak düşündüğümüzde açık uçlu deney ve hipotezi test eden deneylerin azlığı dikkatimi çekmektedir. Bu durum öğrencilerin girişimcilik becerilerine katkıda bulunacağı ancak yetersiz olduğunu düşünüyorum."* şeklinde görüş bildirmiştir. Katılımcıların tamamı ise etkinlikleri yapmak için yeterli zamanın olmadığına dikkati çekmişler ve bunun öğrencilerin girişimcilik becerisinin gelişimine olumsuz yansıyacağını belirtmişlerdir.

Tartışma

Katılımcıların yarısından fazlası (altı katılımcı) yeterli olduğu yönünde görüş bildirirken, diğerleri (dört katılımcı) ise yetersiz olduğunu ifade etmişlerdir. Yeterli olduğu yönünde görüş bildiren katılımcılar görüşlerini; günlük hayatla ilişkili etkinliklerin fazla olması, öğrencileri düşündürmeye iten soruların olması, yaratıcı ve eleştirel düşünmeye yönelik etkinliklerin varlığını gerekçe göstererek açıklamışlardır. Katılımcıların böyle düşünmelerinde etkinliklerin öğrenci merkezli olarak tasarlanmasının (Çelik ve diğ., 2015; Deveci ve Seikkula-Leino, 2015) ve ders kitaplarında yer alan etkinliklerin öğretim programlarında hedeflenen becerileri dikkate alarak hazırlanmasının etkili olduğu söylenebilir (Baysal ve Özkul, 2009; Deveci, Zengin ve Çepni, 2015). Yeterli olduğu yönünde görüş bildiren öğretmenlerin hem 2004 hem de 2013 öğretim programını uygulayan kişiler olması nedeniyle dersine girdikleri öğrencileri derslerinde ve bu öğrencilerin okulda arkadaşları ile olan ilişkilerini gözlemleyerek böyle bir çıkarımda bulundukları görüşmelerde anlaşılmaktadır. Bu bulgu, farklı zamanlarda yapılan çalışmaların sonuçları ile benzerlik göstermektedir (Bacanak, 2013; Bacanak ve diğ., 2012). Bunun yanında 2004 Fen ve Teknoloji Öğretim Programı ile hayatımıza giren yapılandırmacı yaklaşım ile ders içi etkinliklerin de önem kazandığı söylenebilir. Etkinlikler, soyut kavramların somutlaştırılmasında (Karakuş ve Mengi, 2014; Kaptan ve Arslan, 2002), konuların öğretilmesinde ve öğrencilere programda hedeflenen becerilerin kazandırılmasında önemli yer tutmaktadır (Aydemir ve Adamaz, 2017; Bakar, Keleş ve Koçakoğlu, 2009). Fen bilimleri öğretmenleri ders kitabında yer alan etkinliklerin literatürde ifade edilen özellikleri ön plana çıkararak girişimcilik becerisine hizmet edeceği görüşünde birleştiklerini vurgulamışlardır. Diğer taraftan öğretmenlerin bazıları ise etkinliklerin öğrencilere girişimcilik becerisi kazandırma noktasında yetersiz olduklarını ifade etmişlerdir. Katılımcıların birçoğu etkinlikleri sadece girişimcilik açısından değil genel olarak yeterli bulmadıklarını söylemişlerdir. Bu

görüşlerini etkinliklerin açık uçlu deney şeklinde tasarlanmış olmamaları, hipotezi test eden deneylerin azlığı ve etkinlikleri yapacak yeterli sürenin olmaması ile ilişkilendirerek açıklamışlardır. Öğretmenlerin böyle düşünmelerinde; öğrencilerin etkinlikleri yaparken bilim insanı gibi çalışmamaları ve etkinliklerin daha çok bilimsel bilgilerin doğrulanması şeklinde görüşlere sahip olmaları ile açıklanabilir.

Sonuç

Fen Bilimleri öğretmenleri girişimciliği; ekonomi ve üretken olma kavramları ile ilişkilendirerek açıklamışlardır. Öğretmenlerin girişimcilik kavramını ekonomi kavramı ile ilişkilendirerek açıklamaları, çevrelerinde ticaret ile uğraşan bireylerin girişimci özeliklerinin bulunmasından ve öğretmenlerin bu bireyleri gözlemlemelerinden kaynaklanmaktır. Bu sonuç, alan yazındaki girişimcilik konusunda yapılan çalışmaların sonuçları ile benzerlik göstermektedir (Bozkurt, 2011; Deveci, 2016; Sezer, 2015).

Fen Bilimleri öğretmenlerinin yarısından fazlası ders kitabında yer alan etkinliklerin girişimcilik kavramı açısından yeterli olduğu görüşünde iken, diğerleri ise yetersiz olduğunu ifade etmişlerdir. Bu durumun, etkinliklerin günlük hayatla ilişkili olmasından, etkinliklerin öğrencileri düşünmeye iten sorular içermesinden, etkinliklerin yaratıcı ve eleştirel düşünmeye yönelik olarak hazırlanmasından kaynaklandığına inanılmaktadır.

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An Investigation of the Activities in Science Textbooks in terms of the Concept of Entrepreneurship*

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ABSTRACT

The Ministry of National Education (MoNE) has included the concept of entrepreneurship under the skills of life in the Science Curriculum since 2013-2014 academic year. With the inclusion of entrepreneurship concept, it can be said that it is important to investigate the activities included in textbooks in terms of entrepreneurship according to teacher opinions. Within this context, this study aims to take the teacher opinions on appropriateness of the activities in the science textbook to the concept of entrepreneurship. This study was designed according to the qualitative research approach. The study was carried out with voluntary participation of 10 science teachers who work in different middle schools in Van province center. Semi-structured interview forms were used as data collection tools in the study. The obtained data were analyzed using the content and descriptive analysis. According to findings, more than half of the science teachers participating in the study reported that the activities were sufficient to improve the entrepreneurial skills of the students, but the others indicated that the activities were insufficient. Teachers also think that activities related to physics and biology will contribute more to students' entrepreneurial skills. Teachers stated that activities related to chemistry subjects had less effect on students' entrepreneurial skills. It is suggested that researchers should study more widely at different times to reveal the effectiveness of the study.

Keywords: Science teachers, science course, entrepreneurship, activities

Introduction

In its simplest meaning, entrepreneurship is the ability to put forward a new thing by evaluating any encountered situation without being passive in that situation (Bacanak, 2013; Bozkurt, 2011; Sezer, 2015). The characteristics of an entrepreneur are defined in several ways. The concepts of entrepreneurship, entrepreneur and entrepreneurship education have been studied on so far mostly in the fields of

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economics, management and health (Bayrak Kök, 2006; Çakıcı, 2004; Naktiyok, 2004; Ulucan, 2015). Balaban and Özdemir (2008) defined an entrepreneur as an innovative, creative, farseeing and risk-taker individual with a high desire to be successful. According to a related definition provided by the Ministry of National Education (MoNE), an entrepreneur is someone who can make the best use of the encountered situation via a good planning and who can take risks and put forward a product in accordance with any situation (MoNE, 2004). According to economists, an entrepreneur refers to an individual who produces and markets new things. In addition, an entrepreneur can not only analyze and evaluate the probable problems faced while marketing his or her new products but also take action accordingly. In addition, such scientific fields as management, finance, statistics, history, law, geography, psychology, sociology and politics have a close relationship with this concept (Sezer, 2015).

Today, science and technology could be said to develop constantly as well as result in changes in all areas of the society. It is also seen that various changes have occurred in the field of education. Especially for the development of personality traits of individuals and their academic achievement, different learning theories and curricula have been developed (Bacanak, Ülküdür and Öner, 2012; MoNE, 2004). One of these learning theories is the constructivist learning theory, and the science course curriculum is developed in line with this learning theory. The purpose of the curricula based on the constructivist learning theory is to train individuals who can use the necessary information rather than memorizing it and who can investigate, interrogate and produce. In addition, these characteristics are considered to belong to an entrepreneur as well (Deveci, 2016; MoNE, 2004). It could be stated that with the constructivist learning theory in the 2004 Science and Technology Course Curriculum, the concept of entrepreneurship started to get increasingly involved in education. However, the Ministry of National Education updated the 2004 Science and Technology Course Curriculum in the academic year of 2013-2014. As a result of this update, the entrepreneurship skill is now regarded as a life skill (Ministry of National Education [MoNE], 2013). In addition, one of the goals of science education is to teach these skills to students. Students acquiring these skills could be said to develop such skills as solving probable daily life problems and transferring their scientific knowledge into daily life.

There are several ways of helping students acquire these skills. One way is to use textbooks (Özdemir and Yanık, 2017). Textbooks are undoubtedly among the primary course materials which facilitate application of curricula at schools and which act as a guide both for teachers and for students (Ev Çimen and Yıldız, 2017; Sezer, 2015). When the related literature is examined, it is seen that most of the studies were carried out to evaluate textbooks based on teachers' views (Ayvacı and Er Nas, 2009; Özdemir and Yanık, 2017). In addition, review of the related literature revealed that studies on the examination of activities are limited in number and that there is no research conducted to examine the activities in secondary school science textbooks in relation to the entrepreneurship skill. Therefore, the present study is thought to contribute to the related literature.

As the course of science is a discipline open to learning by doing and living, in-class activities have an important place in this respect. Activities, to a great extent, help not only achieve the intended learning objectives of a course but also reinforce students' knowledge. With the help of an attentively-thought and well-designed activity, students can be directed in the desired way. In addition, such instructional methods and techniques as the six-thinking-hat technique and the station technique to be used in the activities prepared will facilitate achievement of the learning objectives. Also, whether the activities in science textbooks help students acquire entrepreneurship skills or not should be taken into account. Examining the activities in textbooks in this aspect is thought to be important for the life skills that students are expected to acquire via the curriculum. In this respect, the limited number of related studies involving examination of activities based on teachers' views makes the present study important.

In international literature, there are many studies conducted on entrepreneurship education. Such studies are abundant especially in developed countries (Agommouh-Patience and Akanwa, 2014; Bacanak, 2013; Deveci, 2016 Özdemir and Yanık, 2017). It could be stated that the number of studies on entrepreneurship in Turkey is quite limited. Among these studies limited in number in Turkey, Bacanak, Ülküdür, Öner (2008) investigated science and technology teachers' views about entrepreneurship skill and about its effects; Güven (2009) examined the renovated curricula of such courses as elementary school Life Science, Turkish Language, Mathematics, Science and Social Studies with respect to entrepreneurial characteristics in Turkey in 2004; Eraslan (2011) studied on teaching entrepreneurship in elementary school curricula; Bacanak (2013) examined the effects of science courses on elementary school 6th to 8th grade students' entrepreneurship characteristics in Turkey; Pan and Akay (2015) tried to determine preservice teachers' levels of entrepreneurship characteristics and examined these characteristics with respect to certain variables; Deveci and Çepni (2015a) aimed to develop an entrepreneurship scale for preservice teachers; Deveci and Çepni (2015b) examined science preservice teachers' entrepreneurship characteristics in term of several variables; Çelik, Gürpınar, Başer and Erdoğan (2015) attempted to determine science teachers' views about students' characteristics of creative thinking and entrepreneurship; and Deveci (2016) studied on the development, application and evaluation of entrepreneurship education models integrated into the elementary school course curriculum of Science (5th to 8th grades).

Within the scope of the constructivist learning approach, students are expected to harmonize their previous knowledge with the new one and place the harmonized knowledge into a correct scheme. Active involvement in this process and production of new ideas are among the objectives to be achieved. When the objectives targeted by the constructivist learning approach are examined, it is seen that these objectives overlap the characteristics of an entrepreneur (Çınar, 2007; Deveci, 2016). With the inclusion of the concept of entrepreneurship in the curriculum, it is thought that the activities in the science textbook should be questioned in line with teachers' views. Teachers' views are considered to be important not only because they provide students

with guidance in class and act as practitioners of curricula but also because the activities in textbooks are intended to help students acquire the entrepreneurship skill. Textbooks are prepared taking the related curricula into account. In this respect, the present study is thought to be important as the activities in textbooks were examined in accordance with teachers!' views (Arion, 2013; Ev Çimen and Yıldız, 2017). Therefore, the purpose of this study was to reveal teachers' views about the appropriateness of activities in the science textbook to the entrepreneurship skill.

Method

Research Design

In the study, the case study method, one of qualitative research methods, was used. The special case method allows doing in-depth examination of or detailed research on a certain group, curriculum and institution (Merriam and Tisdell, 2015). In addition, case studies require integrity, flexibility in the research design and inductive analysis (Merriam and Tisdell, 2015; Yıldırım and Şimşek, 2011). In the present study, the special case method was preferred because the activities in the science textbook were evaluated within the scope of entrepreneurship, because the study was carried out with a limited number of teachers as well as because generalization of the data collected was out of concern.

Participants

For in-depth examination of the situation in qualitative studies, generally, it is more favorable to have a lower number of participants. In the present study, the homogeneous sampling method, one of purposeful sampling methods, was applied. In this sampling, a primarily homogenous sub-group is selected depending on the research purpose (Büyüköztürk, 2008). This study was carried out with 10 volunteering science teachers from different secondary schools in the city of Van in the Fall Term of the academic year of 2016-2017. The criteria for selecting the participants included volunteerism and teaching science in all secondary school class levels in the last five years. As required by scientific ethics, the names of the teachers were not mentioned, and they were coded as T_1, T_2, T_3 and so on. Table 1 presents demographic information about the teachers.

Table 1. Demographic information about the participants

Participants	Gender		Year of Teaching				The Class Levels the Teachers Taught
	Female	Male	1-5 years	6-10 years	11-15 years	16-20 years	
T_1	+		+				5th and 6th
T_2		+		+			7th and 8th
T_3		+	+				6th and 7th
T_4	+				+		7th and 8th
T_5		+		+			5th and 6th
T_6	+			+			5th, 6th and 7th
T_7		+			+		5th and 6th
T_8	+					+	7th and 8th
T_9	+					+	6th, 7th and 8th
T_{10}	+					+	7th and 8th

Reliability and Validity of the Study

In qualitative studies, instead of the concepts of reliability and validity, such concepts as transferability, credibility, consistency and confirmability are used (Denzin and Lincoln, 1994). The credibility of the study was achieved via researcher triangulation and expert examination. The data collected in the study were analyzed by three different researchers. All the three experts had a doctorate degree. In addition, the experts had previously conducted studies using the qualitative research design. For the transferability of the study, purposeful sampling was used, and the research process was explained to the readers in detail. For confirmability, the raw data, findings, interpretations and suggestions were audio-recorded and examined repeatedly. Also, the participants were asked to confirm the data collected via the interview.

Data Collection Tool

In the present study, the data were collected via semi-structured interview. Initially, nine questions were prepared by the researchers. These questions were examined by three different researchers. In addition, the interview form was piloted with six science teachers who took the master's degree course of “Qualitative Data Analysis in Science Education”. The purpose of this pilot study was not only to reveal whether the questions in the interview form were comprehensible or not but also to reveal whether the questions were understood in the same meaning by everyone. In line with the views of the experts and of the six science teachers, the number of the questions in the interview form were decreased to five. The questions were excluded from the interview form because they were found too general and because it was thought they did not serve the purpose of the study. As a result, based on the expert examination, the questions were finalized and transformed into in interview form. The interviews were held at the participants’ schools at different times suitable for them. Each interview lasted about 30 to 35 minutes. The interviews were audio-recorded, which were then transcribed. The questions in the interview form were as follows:

1.What does the concept of entrepreneurship mean to you?

2. How do you evaluate the activities in the science textbook with respect to the concept of entrepreneurship?

3. Do you think the activities in the science textbook contribute to the development of students’ entrepreneurship skills?

4.Which of the lesson units or subjects in the course of Science do you think include activities focusing on the entrepreneurship skill

5. What kinds of activities would you suggest for the development of entrepreneurship characteristics of students in the course of Science?

Data Analysis

For the analysis of the interview data, content and descriptive analyses were used. In the study, the interview data were transcribed into written texts. The written texts were then read repeatedly, and the data which did not address the scope of the study were excluded. In addition, codes and themes were formed by three different researchers in different places at different times. Following this, the three researchers came together and evaluated their analyses. After a discussion process, they reached consensus on the data. In order to determine the consistency of the codes formed by different researchers, the formula suggested by Miles and Huberman (1994) was used to make

calculations in relation to the points of consensus and dissensus. As a result, the themes and codes were re-arranged and or excluded depending on the purpose of the study. The consistency ratio for the interview data was found to be 77%, which was considered to be sufficient (Yıldırım and Şimşek, 2011). The themes and the codes obtained were organized in Tables to make them easier to understand. While making direct quotations from the interview data, the statements which included the codes quite frequently repeated by the participants were used.

Results

This part presents the codes and themes obtained via the interviews. Table 2 shows the science teachers' views about the definition of "Entrepreneurship".

Table 2. Science Teachers' responses to the questions of *"What does the concept of entrepreneurship mean to you?"*

Themes	Codes	Science Teachers									
		T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}
Finance	Risk taking	+	+	-	+	+	+	+	+	+	+
	Pioneering	-	+	+	+	+	+	+	+	+	+
	Trade	+	+	-	+	+	+	+	-	+	+
	Seeking profit	+	+	+	-	+	+	+	+	+	+
	Industry	-	+	+	-	-	+	-	+	-	+
Being productive	Identifying the problems	+	+	+	+	+	-	+	+	+	+
	Producing concrete ideas	+	-	+	+	-	+	+	+	+	-
	Expressing one's own thoughts	-	+	+	+	-	+	+	-	+	+
	Putting forward concrete products	+	+	-	-	+	+	-	+	+	-
	Doing research	-	-	+	+	-	-	-	-	+	+

+: shows the related theme and code.

The science teachers explained the concept of entrepreneurship using the codes of risk taking, seeking profit, trade, industry and pioneering under the theme of ""Finance". In relation to this, one of the teachers, T_2 said *"It is a procedure of risk taking and seeking profit. We can also consider the activities in the fields of industry and trade within this scope. If you have the capital, then there is entrepreneurship.*" In addition, T_5, another science teacher, mentioned the trade-related dimension of entrepreneurship, saying *"It reminds me mostly of trade-related concepts like pioneering, producing new things and creating a market.'* Some other science teachers reported views using such codes under the theme of "Being Productive" as identifying the problems, producing concrete ideas, expressing one's thoughts and pioneering. One of the teachers, T_6, said *"It means doing research on any subject, thinking hard about it and producing new things."*

Table 3 presents the science teachers' views about the second questions in the interview form.

Table 3. Science Teachers' responses to the question of *"How do you evaluate the activities in the science textbook with respect to the concept of entrepreneurship?"*

Themes	Codes	Science Teachers									
		T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}
Sufficient	Existence of activities related to daily life	+	+	-	-	+	+	-	+	-	+
	Existence of thought-provoking questions	+	+	-	-	+	+	-	+	-	+
	Encouraging creative thinking	+	+	-	-	+	+	-	+	+	+
	Focusing on critical thinking	-	-	+	+	-	-	+	+	-	-
Insufficient	Lack of close-ended experiments	-	-	+		+	-	+	-	+	-
	Experiments for confirmation of information	-	-	+	+	-	-	+	-	+	-
	Lack of open-ended experiments	-	-	+	+	-	-	+	-	+	-
	Lack of experiments of hypothesis-testing	-	-	+	+	-	-	+	-	+	-
	Lack of sufficient time	+	+	+	+	+	+	+	+	+	+

According to Table 3, the participants responded to the second question using such codes under the theme of "Sufficient" as existence of activities related to daily life, existence of thought-provoking questions, encouraging creative thinking and focusing on critical thinking under. In relation to this, one of the teachers, T_1, said *"I think there are enough activities, and I believe most of these activities are related to daily life, which will contribute to the development of students' entrepreneurship skills."* In addition, another teacher, T_4, reported views, saying *"Considering the activities in all class levels, we can say in general that there are thought-provoking questions, which encourage creative thinking. Most of the activities include questions which allow students to think and do research, and I think these activities will lead students to entrepreneurship."* On the other hand, some of the participants agreed that the activities were "Insufficient" in terms of entrepreneurship. These participants reported that the close-ended experiments, proof-requiring experiments and open-ended experiments were not enough in the textbook. In relation to this, T_{10}, one of the science teachers, said "*Most of the activities do not include open-ended experiments, and they mostly require confirmation of the information in the textbook. Therefore, I don't think these activities will not be enough to help students acquire the entrepreneurship skills." Some of the science teachers participating in the study* reported their views using the codes of lack of open-ended experiments and lack of experiments requiring hypothesis-testing. In relation to this, one of the teachers, T_7 said *"When we regard the experiments in the textbook as an activity, I can say there are not enough open-ended experiments or those requiring hypothesis-testing. I think this will certainly contribute to students' entrepreneurship skills but to a limited extent."* In addition, all the participants pointed to lack of enough time to do the activities, which they though would have negative reflections upon the development of students' entrepreneurship skills.

Table 4. Science Teachers' responses to the question of **"***Do you think the activities in the science textbook contribute to the development of students' entrepreneurship skills?"*

Themes	Codes	Science Teachers									
		T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}
Yes	Including information related to daily life	+	+	+	-	+	-	-	+	-	+
	Putting forward products via projects	+	+	+	-	-	-	-	+	-	+
	Based on doing research and questioning	-	+	+	-	-	-	-	+	-	+
	Including the nature of science	+	+	-	-	-	-	-	+	-	-
	Alternative measurement and evaluation	+	-	+	-	+	-	-	-	-	+
	Assigning homework related to the subject	-	-	+	-	-	-	-	+	-	+
	Giving weight to social issues	-	+	-	-	+	-	-	+	-	+
No	Lack of discussion	-	-	-	+	-	+	+	-	+	-
	Avoiding focusing on critical thinking	-	-	-	+	-	+	+	-	-	-
	Failure to encourage creative thinking	-	-	-	+	-	+	+	-	-	-
	Existence of activities with their results known in advance	-	-	-	+	-	+	+	-	-	-

More than half of the science teachers reported that the activities in the textbook would contribute to their students' entrepreneurship characteristics using such codes as including information related to daily life, putting forward products via projects, based on doing research and questioning, including the nature of science, alternative measurement and assessment and giving weight to social issues. In relation to this question, one of the teachers, T_2, said *"Students put forward concrete products since they have executed projects. If we guide them as their teachers and encourage them to sell their products, then the course of Science is the most appropriate course to help achieve this."* Another teacher, T_8, mentioned the nature of science, saying *"Since the nature of science is included in the scope of our course, it supports entrepreneurship."* However, fewer than half of the teachers reported that the activities would not sufficiently contribute to the development of students' entrepreneurship skills. Regarding this, these teachers expressed their thoughts of the activities using the codes of lack of discussion, avoiding focusing on critical thinking and failure to encourage creative thinking.

Table 5 presents the science teachers' views about which of the lesson units or subjects should include activities related to entrepreneurship skills.

Table 5. Science Teachers' responses to the question of *"Which of the lesson units or subjects in the course of Science do you think include activities focusing on the entrepreneurship skill?"*

Themes	Codes	Science Teachers									
		T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}
Lesson Unit	Electric energy	-	+	+	-	+	+	-	+	+	+
	Simple machines	+	-	+	+	-	+	+	-	+	-
	Electric in our lives	-	+	-	+	+	-	+	-	-	+
	Human and environment relationships	+	+	-	+	-	-	-	+	-	-
	Our body systems	+	+	+	-	+	-	-	-	+	-
	Mass and heat	-	+	-	-	-	+	-	-	-	+
Subject	Magnetism	-	+	+	-	+	-	+	-	+	-
	Heat and temperature	+	-	-	+	-	+	-	+	-	+
	Cell	-	+	-	+	-	-	+	+	-	-
	Space Research	+	-	+	-	-	+	-	-	+	+
	Acid and base	+	+	-	-	-	+	-	+	-	-

The science teachers stated that activities related to entrepreneurship skills should mostly be included in the lesson units of physics. According to the teachers, the prominent lesson subjects were electric energy, simple machines and electric in our lives. For instance, one of the teachers, T_6, said *"The lesson units of magnetism, simple machines and electric in our lives are more related to our daily lives, and it would thus be easier to put forward concrete products. Also, launching these products into the market requires entrepreneurship."* In addition, the science teachers participating in the study agreed that the lesson units of human and environment relationships, our body systems and mass and heat should include entrepreneurship activities. In relation to this, T_2, one of the science teachers, said *"Because the lesson units of astronomy and human-environment relationships have become a part of recent discussions in our daily and because these lesson units cover current socio-scientific subjects lives, there should be more entrepreneurial activities."*

Table 6 presents the science teachers' views about the kinds of activities to be carried out in the course of Science for the development of students' entrepreneurship skills.

Table 6. Science Teachers' responses to the question of *"What kinds of activities would you suggest for the development of entrepreneurship characteristics of students in the course of Science?*"

Themes	Codes	Science Teachers									
		T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}
Instructional Methods and Techniques	Designing activities according to project-based teaching	+	+	-	+	+	+	-	+	-	+
	Designing activities as open-ended experiments	+	-	+	-	+	-	+	-	+	+
	Preparing activities according to the brain-storming technique	-	+	+	+	-	+	-	+	-	+
	Preparing activities according to the **station** technique	+	+	-	-	+	-	+	-	+	-

Table 6. Continued

Student Dimension	Providing students with opportunities	+	-	+	+	+	+	+	+	-	+
	Developing students' self-confidence	+	+	-	+	+	+	-	+	+	
	Discussing social-content subjects	+	-	+	-	+	-	+	-	+	+
	Directing students towards reading scientific books	-	+	+	+	-	+	+	+	-	-
	Encouragement of students	+	-	+	-	+	-	+	-	+	-
	Making students conscious at earlier ages	-	+	-	+	-	+	-	+	-	+

The science teachers' responses regarding the development of students' entrepreneurship characteristics were gathered under the themes of *instructional methods and techniques* and *student dimension*. The theme of methods and techniques included responses coded as designing activities according to project-based teaching, designing activities as open-ended experiments and preparing activities according to the brain-storming technique. In relation to this, one of the teachers, T_4, said *"Students should be assigned project works about which they can do research out of school, and the activities in the textbook could be based on doing research."* In addition, $Ö_8$ reported that *"If teachers use such teaching techniques in class as student-centered brain-storming and station techniques, I think students' entrepreneurship skills can be developed."* Under the theme of student dimension, the science teachers' responses included such codes as providing students with opportunities to discuss social-content subjects and developing students' self-confidence. One of the teachers, t_{10}, said *"Making social-content discussions in class will develop students' self-confidence."* Another participant, T_7, said "*We should provide students with various opportunities rather than focusing on exams. For this purpose, we should encourage our students to read scientific books and journals. We should also motivate students to produce new things."*

Discussion

In the study, it was found that the science teachers explained the concept of entrepreneurship in association with the concepts of risk taking, pioneering, trading, identifying problems and producing concrete ideas risk alma. It is understood that all these concepts are related to the characteristics that an entrepreneur is supposed to have (Çelik, Gürpınar, Başer and Erdoğan, 2015). The fact that the teachers explained the concept of entrepreneurship in association with the concept of finance is thought to result from their observing the entrepreneurship characteristics of other individuals doing trade. It could be stated that these responses of the participants might have been influenced by recent advertisements of banks, one of media and mass communication tools. Moreover, this result is also thought to be influenced by the fact that entrepreneurship education has mostly been the focus of such fields as finance,

management and health. This thought is consistent with the results of other studies carried out by Bayrak Kök (2006) and Ulucan (2015).

In the present study, the science teachers were found to have different views when the activities in the textbook were evaluated in terms of entrepreneurship. More than half of the participants (six participants) reported that the activities were efficient, while the others (four participants) thought in the opposite way. The participants who believed in the efficiency of the activities tried to justify their thoughts saying that there were many activities related to daily life; that the questions encouraged students to think; and that there were activities allowing students to think creatively and critically. It could be stated that these thoughts of the students might have resulted from the fact that the activities had a student-centered design (Aydemir and Adamaz, 2017; Çelik et.al., 2015; Deveci and Seikkula-Leino, 2015) and that the activities in the textbook were prepared considering the goals and objectives of the related curricula (Baysal and Özkul, 2009; Deveci, Zengin and Çepni, 2015). It was understood from the interviews that the participants who thought the activities were efficient had the opportunity to observe their students in class as well as their relationships with other students at school because these participants were the teachers who applied the curricula of both 2004 and 2013. This finding is supported by the results of other studies conducted in related literature at different times (Aydemir and Adamaz, 2017; Bacanak, 2013; Bacanak et.al., 2012). In addition, it could be stated that the constructivist learning approach has become a part of our lives with the 2004 curriculum of Science and Technology. Activities have an important place in concretizing abstract concepts (Karakuş and Mengi, 2014; Kaptan and Arslan, 2002), in teaching the subjects and in helping students acquire the target skills in the curriculum (Bakar, Keleş and Koçakoğlu, 2009). The science teachers agreed that the activities in the textbook would serve the entrepreneurship skills by featuring the characteristics mentioned in related literature. On the other hand, some of the science teachers reported that the activities were not efficient enough to help students acquire the entrepreneurship skills. Most of the participants stated that they did not just find the activities inefficient in terms of entrepreneurship skills but on the whole as well. The science teachers supported their views in association with the fact that the activities were designed as open-ended experiments; that hypothesis-testing experiments were few in number; and that there was not enough time to do the activities. These thoughts of the teachers could be due to the fact that the students did not work like a scientist while doing the activities and that the activities were rather in the form of confirmation of scientific information.

The third research question was directed in relation to the influence of the activities in the textbook on students' entrepreneurship skills. More than half of the science teachers stated that the activities in the textbook would contribute to students' entrepreneurship characters. They explained these views reporting that the activities included social issues and information about daily life and required doing research and questioning. These thoughts might have been influenced by the fact that the textbooks were prepared considering the skills covered in the curriculum (Aydemir and Adamaz, 2017; Eraslan, 2011; Karakuş and Mengi, 2014). In addition, it could also be stated

that the constructivist learning theory was taken as basis for the preparation of the textbooks. In one study carried out by Bacanak (2013), it was found that science courses were influential on students' entrepreneurship skills. This result is consistent with the related findings obtained in the present study. On the other hand, some of the participants pointed out that the activities in the textbook would not be influential on students' entrepreneurship skills. The teachers explained these views saying that the activities did not involve any discussion or focus on critical thinking and that the activities' results were known in advance. This situation might have been resulted from the fact that the activities were not appropriate to the students' development levels (Bakar, et. al., 2009; Yazıcı and İnce, 2015) and that the time allocated to the activities was insufficient (Ayvacı and Er Nas, 2009; Bakar, et. al., 2009).

In relation to the fourth research question directed to reveal in which of the lesson units or subjects the science teachers thought it would be better to include activities related to entrepreneurship skills, the science teachers mostly mentioned the names of the lesson units and subjects related to physics. For instance, the fact that the teachers mentioned such lesson units as simple machines and electric in our daily lives is thought to result from the fact that the subjects covered in these lesson units are mostly related to daily life. The fact that the teachers pointed to the lesson units and subjects related to physics might have been due to the fact that physics subjects play an important role in the development of science and technology and that this situation is directly influential on the development of students' entrepreneurship (Agommouh-Patience and Akanwa, 2014; Arion, 2013). In addition, it is thought that physics subjects are influential on entrepreneurship because these subjects help solve problems in a number of areas in daily life such as transportation, health, industry and security (Onwioduokit, 2013). Moreover, the teachers also stated that it would be better to teach entrepreneurship skills via lesson units and subjects related to biology. This thought of the teachers could be explained with the fact that most problems encountered in daily life have a direct relationship with biology subjects and that individual's expert in the field of biology have more job opportunities (Ejilibe, 2012). Putting forward products via organic agriculture and launching these products might have direct relationship with the thought that subjects taught in the course of biology develop students' entrepreneurship characteristics (Ejilibe, 2012). These findings revealed a striking result that the teachers did not mention any of the lesson units or subjects related to chemistry. On the other hand, it is a well-known fact that chemistry subjects are among the subjects encountered in daily life. When the related literature was examined, it was seen that the project subjects assigned in the course of chemistry contributed positively to students' entrepreneurship characteristics (Twoli, 2006) and that students' production and marketing of cream, perfume, natural detergent and soap developed students' entrepreneurship characteristics (Ezeudu, Ofoegbu and Anyaegbunnam, 2013). When viewed from this perspective, this result could be said to be inconsistent with the results reported in related literature.

In the study, the fifth question was directed to reveal science teachers' views about what kinds of activities should be carried out in the course of Science for the

development of students' entrepreneurship characteristics. The science teachers participating in the study pointed out that including activities in textbooks based on student-centered teaching methods and techniques would develop students' entrepreneurship skills (Bacanak et.al., 2012; Çelik et.al., 2015; Güven, 2010). The science teachers reported that activities especially prepared in accordance with project-based teaching and open-ended experiments should be included in textbooks. The reason is that such activities will allow students to work like a scientist and to do research and question constantly (Deveci and Seikkula-Leino, 2015; Özdemir and Yanık, 2017). In addition, the science teachers stated that students should be in the center of activities. Also, the science teachers pointed out that students should be provided with opportunities under the guidance of the teacher and that students' self-confidence should be developed. Moreover, they claimed that activities should cover social issues and encourage students to read scientific books. These views of the science teachers might have resulted from the fact that entrepreneurs can express themselves better in social issues and try to solve daily-life problems by doing research (Bozkurt, 2006; Çelik et.al., 2015; Güven, 2010).

Conclusion

The science teachers explained entrepreneurship in association with the concepts of finance and being productive. The fact the teachers explained the concept of entrepreneurship using the concept of finance might have resulted from the fact that acquainted individuals doing business had entrepreneurship characters and that the teachers made observations regarding these individuals. This result is similar to the those of other studies conducted in related literature on entrepreneurship (Bozkurt, 2011; Deveci, 2016; Sezer, 2015).

More than half of the science teachers stated that the activities in the textbook were sufficient in terms of the concept of entrepreneurship, while the others reported opposite views. This situation is thought to result from the fact that the activities were related to daily life; that the activities included questions encouraging students to think; and that the activities were prepared in a way to involve creative and critical thinking.

More than half of the science teachers believed that the activities in the textbook would contribute to students' entrepreneurship skills not only because the activities were based on doing research and questioning and were related to daily life but also because the activities focused on critical thinking and covered social issues.

In addition, the science teachers pointed out that the activities related to physics and biology would contribute more to students' entrepreneurship skills and that the activities related to chemistry would have less influence on students' entrepreneurship skills. Accordingly, it could be stated that the science teachers' views about chemistry subjects were not consistent with the results of other studies reported in related literature (Ezeudu, Ofoegbu & Anyaegbunnam, 2013; Güven, 2010; Twoli, 2006).

Lastly, the science teachers stated that activities based on student-centered teaching methods and techniques would develop students' entrepreneurship skills

(Bacanak et.al., 2012; Çelik et.al., 2015). Also, the science teachers reported that activities involving especially project-based teaching and open-ended experiments should be included in textbooks.

Suggestions

In order for activities in science textbook to have positive influence on students' entrepreneurship skills, the activities should be prepared in a way to have a relationship with daily life and to help students acquire the 21st century skills (creativity, critical thinking, problem solving and so on).

One of the basic goals of science teaching is to help students acquire scientific process skills. Therefore, activities in textbooks could be designed in a way to help students acquire scientific process skills.

Experiments have an important place as an activity in the course of Science. For this reason, while designing the experiments in a science textbook, it would be beneficial to consider the invention-based approach, one of student-centered laboratory approaches. According to the basis of this approach, students are expected to use scientific process skills, to work like a scientist, to learn individually and to reach the necessary information on their own.

In order for activities in science textbooks to reveal students' entrepreneurship skills, studies should be conducted with a larger study group. It would be better to conduct studies on designing activities especially related chemistry subjects.

For the purpose of getting more detailed information about the activities in textbooks in relation to entrepreneurship skills, activities belonging to a certain class-level could be taken into account, and different related data collection tools could be used.

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