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Development of Teaching Packs of Exhibitions in Science Centres into Elementary School Science Curriculum for Grades 5-8: Konya Science Centres Sample

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Abstract

Science courses in elementary schools are one of the most important courses which build attitude towards science, scientific thinking system and knowledge basis. Due to these reasons, exhibitions/materials in science centres should particularly be connected to science curriculum and these will make important contributions to the education of younger generation who like, understand, and use/produce science. The purpose of the research which will be carried out within this framework is to develop teaching packs to integrate exhibitions/materials in Konya Science Centre in elementary school science curriculum for grades 5-8. The teaching packs which have been developed will include the following information: which exhibitions / materials will be visited regarding the subjects/ concepts and gains in science curriculum, how to maximize the effectiveness of the trips (pre-visit and post visit materials) (information sheets before the trip, worksheets during the trip, and evaluation forms after the trip). These documents will be a resource for teachers regarding using science centres in science instruction and it will also connect science centres which were set up and continue to set up in our country to science curriculum. Moreover, the research can be regarded as a pre-study for science centres intended to be set up in 81 cities to promote science course.

Key words: konya science centre; science course; science curriculum; teaching packs

Introduction

According to the understanding accepted in the modern world, education has gone beyond the confines of four walls and it has been regarded as life itself with the slogan “education everywhere”. One of the out-of-school settings which will actualize education everywhere, one of the fundamental principles of National Education’s fundamental law (MEB, 2014) is science centres. After the Industrial Revolution, science centres which started be founded in the form of assembling and exhibiting scientific tools with the intention of having people comprehend the logic of the tools used made a rapid progress (Alpagut, 2002). Science centres have gained more importance in our day due to the rapid developments in science and technology and they have taken the form of a place which offers opportunities for

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recreating the technologies developed by the mankind, doing informative experiments besides these technological products, and enabling visitors to establish relationship with the objects on display instead of confining themselves to looking at them. All these features are the most important points that distinguish science centres from the other museums.

Science centres which provide opportunities for the increasing population to learn out-of-school settings make contributions to visitors to discover freely, learn on their own, and share their experiences via interacting and communicating with groups. Science centres have been founded with the intention of introducing fundamental principles of science to visitors, causing them to love science, enabling them to make observations by doing experiments, promoting scientific literacy, entertaining and arousing curiosity and excitement, and making contribution to non-formal education. Thus, considering the following purposes of the non-formal education which are “Offering education opportunities that facilitate students’ adaptation to scientific, technological, economic, social and cultural developments” and “Having students gain habits to use their spare time efficiently and effectively”, the importance of science centres become more evident (Bozdoğan, 2007).

At this point it is important to have a look at the Science Curriculum (3rd-8th grade) updated in 2013 in our country. According to the 3rd-8th grade Science course curriculum updated in 2013, “Learning environments in which students will be active and teachers will be facilitators and guides while planning and implementing the course were chosen as a base. In-class and out-of-school settings are designed according to the inquiry-based learning strategy so that students can learn the information in science field meaningfully and permanently. Within this context, the statement “informal learning settings (science, art, and archaeology museums, zoos, natural environments and etc.) are utilized” refer to out-of school settings (MEB, 20013). This condition clearly reveals that a bridge must be built between science centres and science courses because science courses in secondary schools are one of the main courses which lay the foundation of attitudes towards science and scientific thinking system and scientific knowledge substructure. Due to these reasons, associating exhibitions/ materials in science centres to especially science course curriculum will make important contributions to training new generations who are scientifically literate, like, understand, and use/produce science.

Within this context, teachers have an important role to organize these out-of school settings in such a way that they can support education at school. It is required that teachers must be actively engaged in organizing trips to these places and make an intensive effort for a successful trip (Demir, 2007a; Kete and Horasan, 2013). However, the studies carried out reveal that although teachers know that such trips planned and organized to out-of-school settings will have positive effects on students, they do not frequently prefer these activities (Carrier, 2009; Moseley, Orion, Hofstein, Tamir and Giddings, 1997; Reinke and Bookout, 2002; Simmons, 1998; Smith-Sebasto and Smith, 1997; Tatar and Bağrıyanık, 2012; Türkmen, 2010). The reasons why teachers do not prefer these settings a lot are that they are pedagogically incompetent (Griffin and Symington, 1997; Kisiel, 2003; Michie, 1998; Olson, Cox-Petersen and McComas, 2001; Tal and Morag, 2009; Tal and Steiner, 2006), they are not actively engaged in school trip procedures and they do not have any ideas about the trip planning process (Anderson, Bethan and Mayer-Smith, 2006; Bowker, 2004; Bozdoğan, 2012; Demir, 2007b; Ferry, 1993; Tal, 2004; Tal, Bamberger and Morag, 2005). As seen, the studies have revealed that teachers encountered different problems about organizing a trip related to the course.

When the leading and institutionalized science centres in the world like The Deutsches Museum (German Museum) in Germany, The Exploratorium in the USA, London Science Museum in England, and Ontario Science Centre in Canada are examined, it is found that each of them has a museum education program of their own and these education programs develop content with regard to different age groups and interests. Within the context of these education programs designed considering the exhibitions they contain within themselves, the museums staff who are experts in their fields have the participants comprehend which scientific knowledge (concept, principle, law and etc,) the exhibition is based on by letting them try. While doing this, a lot of methods like laboratory practices, workshops, and videos are used. In addition, it is found that there are teacher training programs for teachers' training in science centres. Moreover, there are guidebooks which are published by them in different languages introducing exhibitions in science centres and academic books which present scientific knowledge related to the exhibitions. However, it is observed that there are not education programs in science centres which are directly related to the science curriculum and which will become a resource for teachers. The same condition is valid for the science centres which are planned to be established with the support of The Scientific and Technological Research Council of Turkey (TUBITAK). The education programs of the science centres which have started to be founded in our country will be designed and developed in the process via examining the samples in the world and they will be put into service mainly for students and all individuals.

From this point of view, the purpose of the study is to present a sample based on integrating materials in science centres which have started to be founded in Turkey into Science courses which form attitudes towards science, scientific thinking system and scientific knowledge substructure. Within this context, an example from earthquake formation section chosen out of the materials in Konya Science Centre, the first science centre supported by TUBITAK in Turkey, will be presented.

A Sample Teaching Package Template

The sample prepared consists of four pages. On the first page, there are explanations about the material on display in the science centre with regard to being a guide for the teachers and these explanations include which subject and learning outcomes in science course the material is related to. Following this, the points the teachers should take into consideration during the field trip procedure are listed. On the second page, the visuals and explanatory information about the material exhibited in the science centre are given. On the third page, there are worksheets which students have written down the scientific knowledge they gained as a result of the experiments they did using the material during the trip. On the fourth page, there is a post-trip evaluation sheet which will be administered with the students coming back to the school after the trip. Alternative assessment and evaluation techniques are used with the questions on this page and they aim at determining to what extent the trip has attained its goals. The teaching package consisting of four pages were presented below.

Figure 1. Pages

ETKİNLİK 1. DEPREMLER NASIL OLUŞUR?	
Ders	Fen Bilimleri Dersi
Sınıf	8. sınıf
Etkinliğin Amacı	Öğrencilere depremin ne olduğu ve nasıl meydana geldiği konusunda bilgi ve beceriler kazandırmaktır.
Sergi	1. Anadolu plakası standı 2. Fay hatları standı 3. Deprem oluşumu (Fay hatlarındaki kırılmalar) ile ilgili deney düzenekleri
Dersle ilişkilendirme Öğrenme alanı Ünite/Konu adı Kazanımlar	Dünya ve Evren Deprem ve Hava Olayları 8.8.1.1. Depremle ilgili temel kavramları bilir 8.8.1.3. Türkiye'nin deprem bölgeleriyle fay hatları arasında ilişki kurar.
Öğretmene uyarılar	1. Bu etkinlikten önce öğrencilerin doldurması gereken çalışma yapraklarını dağıtınız. 2. Rehber/lerin (öğretmenin kendisi de olabilir) etkinlik sürecinde öğrencilere deprem ve oluşumuyla ilgili deney setlerinin nasıl kullanılması gerektiği konusunda yardımcı olmasını sağlayınız. 3. Öğrencilerin tek tek ya da küçük gruplar halinde deney setlerini kullanmalarına imkân sağlayarak depremin ne olduğu ve nasıl meydana geldiği konusunda bilgiler edinmelerine yardımcı olunuz. 3. Öğrencilerin edindikleri bilgiler doğrultusunda dağıttığımız çalışma yapraklarını doldurmalarını sağlayınız. Ancak bu süreçte öğrencilerin çalışma yapraklarındaki sorularına doğrudan cevap vermeyiniz. Öğretmen sorularının cevaplarını kendileri keşfederek bulmalıdır. 4. Bilim merkezi gezisinin son 15 dakikasında gözetimimizde öğrencilerin ilgileri çerçevesinde serbest dolaşmalarına imkân sağlayınız. 5. Gezi sürecinde öğrencilerinize aşırı derecede sorumluluk yüklemeyiniz, onların eğlenmesine ve sosyal etkileşimde bulunmalarına özen gösteriniz. 6. Okula döndüğünüzde yapılan bu etkinliğin ne derece amacına ulaştığını tespit etmek için ekte verilen gezi sonrası değerlendirme yaprağını öğrencilerinize uygulayınız ve gezinin etkililiğini değerlendiriniz. 7. Yapılan etkinlikle ilgili sınıfta tartışmalar düzenleyerek yanlış ya da eksik öğrenilen kavramların düzeltilmesini sağlayınız. 8. Ayrıca gezide çekilen fotoğrafları okul panolarında sergileyebilir, öğrenci ailelerine gezide yapılan çalışmalar hakkında bilgi verebilirsiniz. 9. Yapılan gezideki aksaklıkları (eğer varsa) gözden geçirilerek bir sonraki gezi için daha iyi bir planlama yapınız.


Page 1

ÇALIŞMA YAPRAĞI


Adı, Soyadı: _____
Numarası: _____


Adı, Soyadı: _____
Numarası: _____


Anadolu Levhası standını ve Fay hatları standını inceleyiniz. Tektonik hareketlerin çeşitlerinin gösterildiği deneyleri yapınız ve aşağıdaki soruları cevaplayınız.

Anadolu levhası nereden geçmektedir? Çiziniz.


Kaç çeşit tektonik levha hareketi vardır? Bunların isimleri nelerdir?
.....
.....
.....
.....

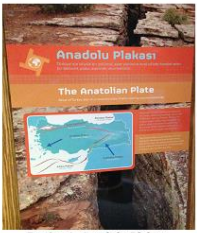

Yaklaşma hareketi deneyini yapınız ve gözlemlerinizi yazınız.
.....
.....
.....
.....



Uzaklaşma hareketi deneyini yapınız ve gözlemlerinizi yazınız.
.....
.....
.....
.....


Enine hareketi deneyini yapınız ve gözlemlerinizi yazınız.
.....
.....
.....
.....

Page 3


SERGİLERİN İÇERİĞİ



Resim 1. Anadolu Plakası (Levhası) standı


Resim 2. Fay hatları ve deprem oluşum çeşitleri standı


Türkiye'nin üzerinde bulunduğu Anadolu plakası (levhası) hakkında bilgiler verilmektedir.

Resim 2'de fay hatları ve tektonik plakaların hareketleri hakkında bilgiler sunulmaktadır.


Resim 3. Yaklaşma (Dalma batma) levha hareketleri ile depremin nasıl olduğunu gösteren deney düzeneği


Resim 4. Uzaklaşma (Sırt yayılması) levha hareketleri ile depremin nasıl olduğunu gösteren deney düzeneği


Her üç deney sisteminde de öğrenciler levhalar arasında plastik bant yapıştırarak ve daha sonra düzeneğin yanındaki kolu çevirerek plakaların hareket ettirecektir. Yapıştırdıkları bantlardaki değişimleri (depremin sonuçları) gözlemleyecektir.



Resim 5. Enine (Yanal) levha hareketleri ile depremin oluşumunu gösteren deney düzeneği


Page 2

Adı, Soyadı: _____
Numarası: _____

GEZİ SONRASI SINIF İÇİ DEĞERLENDİRME YAPRAĞI

Aşağıdaki resimlerde hangi tür levha hareketi olmuştur? Boşluklara yazınız.

(.....)


(.....)


(.....)

Depremler nasıl oluşur? Etkileri nelerdir?
.....
.....

Doğru çıkış kısmını bulunuz.

Yerkabuğu yedi büyük levhanın birleşmesi ile oluşmuştur.

Levha hareketleri uzun zaman önce gerçekleşmiştir. (1)

Levha hareketleri süratli devam eden bir süreçtir. (2)

Levha hareketleri uzaklaşma, yaklaşma ve enine olabilir. (3)

Levha hareketleri sadece katlar bulundur. (4)

Levhaların yaklaşıp birbirini sıkıştırması ile okyanus tabanları oluşur. (5)

Depremler levha hareketleri sonucunda oluşur. (6)

Levha hareketleri (7)

Depremler levha hareketleri sonucunda oluşur (8)

Page 4

Discussion and Suggestions

It is considered that the science centres which have started to be founded in Turkey must have teaching packages which will support education at school so that they can be used effectively and efficiently. Moreover, this study can be regarded as a preliminary study for the science centres which have been planned to be founded in 81 cities to support science courses. Science courses in secondary schools are one of the main courses which lay the foundation of attitudes towards science and the substructure of scientific thinking system and scientific knowledge. Because of these reasons, relating exhibitions/ materials in science centres to especially science course curriculum will make important contributions to training new generations who are scientifically literate, like, understand, and use/produce science.

The teaching packages prepared include information about which exhibitions/ materials will be visited or used for which subjects/ concepts and learning outcomes in science course curriculum and which method will be followed during the trip procedure and they will have a potential to become a resource for teachers. Thus, they will make contributions to science teachers to plan and organize effective and efficient science centre visits related to their courses. These teaching packages can be combined and become a book/ booklet. In addition to this, they can be presented on the websites of science centres. Considering that the prepared teaching package will set an example, it is predicted that they can make contribution to the formation of teaching packages for high school physics, chemistry, and biology courses. These teaching packages will be uploaded to the Educational and Informatics Network (EBA) and all of the science course teachers working in our country will have an opportunity to use them.

References

- Alpagut, A. (2002). Çevre İçin Eğitimde Müzelerin ve Müzeciliğin Rolü. Ankara Üniversitesi Sosyal Bilimler Enstitüsü Sosyal Bilimler Çevre Anabilim Dalı. Ankara. (Yayınlanmamış Yüksek Lisans Tezi).
- Anderson, D., Bethan, L. & Mayer-Smith, J. (2006). Investigating the impact of practicum experience in an aquarium on preservice teachers. *Teaching Education*. 17, 341–353.
- Bowker, R. (2004). Children's perceptions of plants following their visit to the Eden Project. *Research in Science and Technological Education*. 22(2), 227-243.
- Bozdoğan, A. E. (2007). Role and Importance of Science And Technology Museum in Education. Unpublished doctoral dissertation, Gazi University, Enstitute of Educational Science. Ankara, Turkey. (Unpublished Doktoral Dissertation).
- Bozdoğan, A. E. (2012). Eğitim amaçlı gezilerin planlanmasına ilişkin fen bilgisi öğretmen adaylarının uygulamaları: Altı farklı alan gezisinin değerlendirilmesi. *Kuram ve Uygulamada Eğitim Bilimleri*, 12(2), 1050-1072.
- Carrier, S. J. (2009). The effects of outdoor science lessons with elementary school students on preservice teachers' self-efficacy. *Journal of Elementary Science Education*, 21(2), 35-48.
- Demir, M. K. (2007a). Sınıf öğretmeni adaylarının gözlem gezisi yöntemine bakış açılarının incelenmesi. *Gazi Eğitim Fakültesi Dergisi*, 27(3), 83-98.
- Demir, M. K. (2007b). Sınıf öğretmenlerinin Hayat Bilgisi ve Sosyal Bilgiler derslerinde gözlem gezisi yöntemini uygulama durumları. *Türk Eğitim Bilimleri Dergisi*, 5(2), 323-341.

- Ferry, B. (1993). Science centers and outdoor education centers provide valuable experience for preservice teachers. *Journal of Science Teacher Education*, 4, 85–88.
- Griffin, J. & Symington, D. (1997). Moving from task-oriented to learning-oriented strategies on school excursions to museums. *Science Education*, 81 (6), 763–779.
- http://mevzuat.meb.gov.tr/html/temkanun_0/temelkanun_0.html adresinden 10.12.2014 tarihinde indirilmiştir.
- Kete, R. & Horasan, Y. (2013). Öğretmen adaylarının uygulamalı (Doğa merkezli) Biyoloji derslerinde verimlilikleri. VI. Ulusal Lisansüstü Eğitim Sempozyumu Bildiriler Kitabı II, 85-90.
- Kisiel, J. (2003). Teachers, museums, and worksheets: A closer look at learning experience. *Journal of Science Teacher Education*, 14, 3-21.
- MEB, (2013). 3-8. Sınıflar Fen Bilimleri dersi öğretim program. Talim ve Terbiye Kurulu Başkanlığı, Ankara.
- Michie, M. (1998). Factors influencing secondary science teachers to organize and conduct field trips. *Australian Science Teacher Journal*, 44, 43 – 50.
- Moseley, C.; Reinke, K. & Bookout, V. (2002). The effect of teaching outdoor environmental education on preservice teachers' attitudes toward self-efficacy and outcome expectancy. *The Journal of Environmental Education*, 34(1), 9-15.
- Olson, J. K.; Cox-Petersen, A. M. & McComas, W. F. (2001). The inclusion of informal environments in science teacher preparation. *Journal of Science Teacher Education*, 12, 155-173.
- Orion, N.; Hofstein, A.; Tamir, P. & Giddings, G. J. (1997). Development and validation of an instrument for assessing the learning environment of outdoor science activities. *Science Education*, 81, 161-171.
- Simmons, D. (1998). Using natural settings for environmental education: Perceived benefits and barriers. *Journal of Environmental Education*, 29 (3), 23–31.
- Smith-Sebasto, N. J. & Smith, T. L. (1997). Environmental education in Illinois and Wisconsin: A tale of two states. *Journal of Environmental Education*, 28 (4), 26-36.
- Tal, T. & Steiner, L. (2006). Patterns of teacher-museum staff relationships: School visits to the educational centre of a science museum. *Canadian Journal of Science, Mathematics and Technology Education*. 6(1), 25-46.
- Tal, T. & Morag, O. (2009). Reflective practice as a means for preparing to teach outdoors in an ecological garden. *Journal of Science Teacher Education*, 20, 245-262.
- Tal, T. (2004). Using a field trip as a guide for conceptual understanding in environmental education: A case study of a pre-service teacher's research. *Chemical Education Research and Practice*, 5, 127–142.
- Tal, T., Bamberger, Y. & Morag, O. (2005). Guided school visits to Natural History Museums in Israel: Teachers' roles. *Science Education*, 89 (6), 920-935.
- Tatar, N. & Bağrıyanık, K.E. (2012). Fen ve Teknoloji dersi öğretmenlerinin okul dışı eğitime yönelik görüşleri. *İlköğretim Online*. 11(4), 883-896.
- Türkmen, H. (2010). İnfomal (Sınıf-Dışı) Fen Bilgisi eğitimine tarihsel bakış ve eğitimimize entegrasyonu. *Çukurova Üniversitesi Eğitim Fakültesi Dergisi*, 3(39), 46-59.