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Developing Activities Of Out Of The School Learning Environments For Science Classes, And Analysing Their Effects On Students' Scientific Process Skills

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Extended Summary

Introduction

Learning environment, which generally expresses the external conditions of the concept of learning, is defined as the domains in which especially teaching materials and teaching tasks are structured and thus the desired process of teaching is performed (Taşçı and Soran, 2008). Rapid changes occurring in the field of science and technology have expanded the term of learning environment – just as it has expanded several concepts. Learning environments primarily thought as inside the classroom has been expanded in a manner as to include out of the school environments also. Yet, it is observed that the concepts of formal and informal learning are disputed in the literature, that efforts are made to conceptualise and classify various fields, and that there is no agreement on this concept. Hofstein and Rosenfeld (1996) point out that informal science learning environments –which they find difficult to define- can be listed as museums, zoos, botanical gardens, science centres and fields of nature. Besides, Eschenhagen, Katmann and Rodi (2008) state that all fields of nature such as school gardens, agricultural fields, and national parks close to schools can be used as out of the school learning environments. Behrent and Franklin (2014) consider trips to these fields as students' educational experiences out of the school. Field trips ensure that the concepts of science are learnt in authentic environments through experiences. The quality of those experiences assures that learners learn in-depth and that their interest

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increases. Research has shown that out-of-the-school learning environments are influential in the development of students' science skills, in learning various subjects of science by discovering, in the increase in their academic achievement and their attitudes towards science and in enlivening their scientific curiosity, that those environments facilitate learning, that they enable students to gain first-hand experience, and that they contribute to associating real life with what is learnt at school, to making observations, to data collection, and to interpretation skills by making inferences (Balkan Kıyıcı and Atabek Yiğit, 2010; Bozdoğan, 2007; Chin, 2004; Cox-Petersen, 1999; Griffin, 2004; Guisasola, Morentin and Zuza, 2005).

This study aims to develop activities in relation to using out-of-the-school learning environments and to analyse them from the aspect of scientific process skills (SPS). Thus, the basic research problem was formulated as in the following:

Are there any statistically significant differences between scientific process skills scores of experimental group students who were exposed to out-of-the-school learning environments and those of control group students who were taught in classroom settings?

Method

This is a quasi-experimental study conducted with 56 fifth graders attending a secondary school in İliç district of Erzincan in the 2014-2015 academic year. The students in the experimental group studied in an orchard in the vicinity of the school by using the technique of learning in stations, with the help of knowledge sheets. The control group students, on the other hand, were taught inside the school during this period. Data were collected from both groups at the end of this period of time by using observation forms requiring observation, data recording, measuring, classification and operational definition skills. A rubric was used in assessing those scientific process skills. The students were evaluated by two science teachers using the rubric, and Pearson's correlation coefficient was calculated, and reliability coefficient was calculated by using Spear-Brown reliability prediction formula since the average for the scores given by the two raters was used (Crocker and Algina, 1986). The rubric scores were analysed by using unrelated (independent) samples t- test. The SPSS 18. 00 Statistical packet for social sciences was employed in the analyses.

Findings

Independent Groups t-test Results

Table 1. Independent Samples t-test Results for the Experimental and the Control Group

SPS	Groups	n	$\overline{X}$	SD	df	t	p
Observation and model formation	Control	27	1.019	0.612	54	-3.414	001
	Experimental	29	1.552	0.557			
Data recording	Control	27	1.037	0.619	54	.717	477
	Experimental	29	1.555	0.614			
Measurement and classification	Control	27	0.907	0.605	54	-.688	.495
	Experimental	29	1.017	0.590			
Operational definition and prediction	Control	27	0.833	0.679	54	-2.728	009
	Experimental	29	1.345	0.721			

According to Table 1, activities implemented in out-of-the-school learning environments have significant effects on observation skills ($t(54)= -3.414$, $p< 0.05$). As is clear from the table, there is a significant difference between the experimental group ($X=1.345$) and the control group ($X=0.833$) in favour of the experimental group in terms of operational definition and prediction skills. No significant differences were found between the groups in terms of data recording skills ($t(54)= -.717$, $p>0.05$) and measurement and classification skills ($t(54)= -.688$, $p>0.05$).

Conclusions and Discussion

This study, which analysed the effects of out of the school field trip activities on students' SPS in the framework of the science subject of "Let us Learn Living Organisms", calculated the arithmetic averages for the post-test given to the experimental and the control group students. On comparing the averages, it was found that the levels of scientific process skills of the experimental group students who were exposed to activities of out-of-the-school learning environments were higher than those of the control group students.

It was found that the experimental group students' participation in out-of-the-school activities influenced their observation, data use and model formation skills in positive ways and improved those skills. In parallel to the findings obtained in this study, Balkan Kıyıcı and Atabek Yiğit (2010) found that out-of-the-school environments enabled students to make observations. No significant differences were found between the experimental and the control groups in terms of data

recording, and measurement and classification skills. This finding was attributed to the fact that this was a short term study and that the activities were frequently done in the in-class applications in accordance with the curriculum. A review of the literature indicates that long-term and repeated trips should be organised in order for effective learning to occur in out-of-the-school learning environments (Bozdoğan and Yalçın, 2006). Besides, it was also observed that the experimental group students' participation in out-of-the-school activities improved their operational definition and prediction skills. The improvement of these skills in out-of-the-school learning environments was attributed to the fact that individuals were active in the process of reaching knowledge and that they structured the knowledge. Supportive of the findings of this study, Yavuz and Balkan Kıyıcı (2012) point out that out-of-the-school learning environments make abstract concepts meaningful by making them concrete though one to one interactions.

In conclusions, out-of-the-school field trips to a number of places from botanical gardens to science centres as well as to appropriate fields of nature close to the school can be organised. In this study, a non-agricultural hobby garden was chosen in order to observe and understand the diversity of living organisms through samples of different plants. With the environment prepared, it was assured that students observed and described real samples of plants, and it was also assured that they analysed conceptual knowledge with the help of knowledge sheets. This contributes to them significantly in looking at the samples of living organisms in their vicinity more scientifically and in making sense of nature. This also assures that scientific process skills such as making observations, classifying, measurement, data recording and using, and model formation –which are predicted by the curriculum- are improved.

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