AJESI - Anadolu Journal of Educational Sciences International, 2018; 8(1): 80-97
DOI: 10.18039/ajesi.393883

Environment Education and Architecture

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Submitted by 28.01.2018 *Accepted by 04.02.2018* *Research Paper*

Abstract

For a sustainable environment, the notion of educating the children from the early years regarding the environment is becoming more commonplace. Therefore the subject of environment in the current education system shall be reviewed. Contrary to popular belief, environment do not only consist the natural formations and the importance of built environment and its relation to ecological balance is not fully understood. For this reason, the aim is to improve the current environment education in terms of context and governance and the field studies conducted for this purpose include architecture based environment education events. For this study, the different methods for processing the issue of environment in lessons are reviewed and consisted 65 students, 30 being the experiment group, that are in 4th grade in 2 different schools. The quantitative and qualitative research methods are used in tandem. As the results of the study is reviewed, it is seen that the students who participated to the workshop have become more knowledgeable in terms of "environment, ecology and sustainability" and are able to apply their knowledge by constructing models. Based on these results, the studies that will be conducted in the future regarding environment education, it is recommended that a holistic approach that includes the built environment to be adopted.

Keywords: Ecology, sustainability, built environment, environment education, architecture

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Introduction

Environment, being the surrounding of an individual, is a rich material that influences the understanding of one's behavior, herself and the external world (Howard, 2000). It is known that the formation of the identity and the essence at childhood, "environment" has a fundamental place (Spencer & Blades, 2006). Piaget also highlighted that the children also perceive and interpret the external world by exploring the environment (Bell, 2006).

The environmental psychologists review the environment in two topics. The natural environment where the humans are reciprocally interact with other living organisms, or the artificial or built environment where the human-made buildings are present (Graves, 1990). UIA Union of International Architectures Children's Architecture Commission do not separate the natural and built environment with distinct lines, on the other hand uses the phrase "our buildings, cities and natural environment" to define the built environment (Built environment education at UIA, 2011). Therefore the perception of environment in first world countries is holistic and includes the built structure. Therefore, when environment is concerned, it is thought that a definition separated from the built environment would not be a complete definition.

Different professions define the concept of environment with differing priorities. In this context one cannot expect an architect, an environmental scientist or a tutor to define the concept of environment with the same context. However, with the development of environmental consciousness some common terminologies are to be utilized, the requirement to process the environment in most of disciplines that has the environment as a field of interest, as a multi-faceted manner. Based on this the environment consists the physical, biological, social, economic and cultural setting that the humans are in interaction with themselves and other organic and inorganic entities.

Regardless of the definition, it is seen that the importance of environment is being recognized throughout the world at an increased rate. Due to this awareness, predominantly UIA member countries, throughout the world it is proclaimed that environment education shall be provided at an early age. The mentioned environment education is defined as "a constant state of learning in which provides insight, capability, values and experience to solve environmental issues and ensuring that the individuals are aware of their immediate environment" (Vaughan et. al. 2003). The aim of environmental education is to increase the awareness of environment of the individuals, their sentiment towards the environment and creating a sustainable environment (United Nations Educational, Scientific and Cultural organization [UNESCO], 1980). In addition to this perspective that is conceived following Tbilisi Convention (1977), as specified by Graves, the environment education has a major stake in raising contributing individuals who can have a critical perspective and decide on social issues (Graves, 1990).

İleri, associates his own views with environmental education as "(1) Awareness of environment and environmental issues and developing conscience, (2) Obtaining information regarding the environment and environmental issues, (3) Having to adopt positive and realistic attitude, (4) Propagation of required philosophy to develop and protect the environment, (5) Developing the skills and approaches in determining, understanding and solving process and approaches in determining the environment and environmental issues, (6) Ensuring contribution to creation, preserving and resolving the issues regarding the environment" (İleri, 1998).

The environmental education processes that may be elaborated through various reasons, in various countries around the world such as USA, Finland, England, Germany, Ireland and Japan, different priorities may be processed.

For example, in England, it is seen that the "sustainability" term is being more highlighted compared to other countries.

Since 1999, in England the children are being lectured regarding "defining and preserving the natural and built environment, enhancing the sustainable environment awareness". The majority of these studies are undertaken by CABE (Commission for Architecture and the Built Environment). Issuing various publications in order to support the education of build environment, CABE is an important publication resource that provides budgets, projects to various centers and creates events. The center has publications about various subjects such as "public areas, school designs, architecture for everyone, healthy environment" (Gülay Taşçı, 2014). Many of these publications have the "sustainability" theme and provide information to the children regarding designing a sustainable environment design.

It is also known that in other European countries, the subject of increasing sustainable environmental awareness in education and architecture policies are significant. The environmental education provided in these countries include the natural and built environment and the need for designing the built environment as an environment-friendly project is also highlighted. Especially the school buildings, any architecture design includes the theme of sustainability as a primary feature and the children are lectured via the building that they are taught in and they learn by living in the building, experiencing it. Furthermore, in countries such as Finland where the educational successes are prominent, the inclusion of environment education in the education curriculum is being worked on (http:// www.arkkitehtuurikasvatus.fi/english/yleistmiksi.php).

In Turkey the subject of sustainable environment is not highlighted as it should be. There aren't many examples for buildings that are designed with the sustainable environment awareness in focus.

The education system is facing a similar issue. As the Turkish national curriculum is reviewed, the life sciences, social studies and science lessons are limited to the natural environment in teaching the environment as a whole and while the built environment is non-existent, for example the theme of sustainability is mentioned briefly only related with the "ecology" theme in only science lessons finitely (http://ttkb.meb.gov.tr).

Based on the observations made throughout the attended lessons prior to the study, another prominent issue is the reliance on traditional methods to provide the environment education predominantly and utilization of presentation strategy and verbal lecture methods. On the contrary, when the first world countries are reviewed, the environment education includes the built environment and the lecture includes the methodologies that are utilized in architecture education (see: Examples from USA, Finland, England, Ireland, Germany, Japan) (Gülay Taşçı, 2014).

The primary goal of this study is to change the perception of environment education, the context and application of environment education and as in the countries that place importance on the "sustainability" term by utilizing the architecture discipline, to ensure that the built environment to be approached associating with natural environment. For this purpose, this study is centered on a sample workshop that is conducted on two schools with the enhanced environment education approach that utilizes architecture discipline. As this workshop was designed, the built environment was utilized as the context and the methodology utilized by the architecture was adopted as the method.

Architecture Based Workshop

This study is designed in align with especially social studies and science curriculum that include the "environment" topic. The goals of these lectures are reviewed and the

associated goals of the educational workshop are created. Therefore the primary goals associated with architecture: "i.)To review the influence of natural environment, environmental events and the climate on the building ii.)Learn about sustainability iii.)To indicate the criteria for ecologic building design".

The sample for the study: The workshop was conducted at one public school and one private school with different socio-economical levels. At each school, two groups are formed by 4th graders, one being the experiment group, while the other being the control group. For this workshop, 17 students are included in the experiment group of the school with a lower socio-economic level while the control group includes 15 students. At the school with a higher socio-economic level, the experiment group includes 13 students while the control group includes 20 students. The preliminary test and final tests of the study are conducted with 65 students while the workshop that focus on environment are completed with 30 students.

Method of Research: Quantitative and qualitative research methods are utilized in tandem as the method of research for this study. The qualitative research method relies on observation and is utilized to observe the current lessons and the students in the following workshop conducted afterwards. Furthermore, during evaluation of results, qualitative data are utilized for portfolio and product evaluations. Qualitative research methods are utilized in order to comprehend the pre-study environmental awareness and evaluating the results of the study.

In order to ensure different validity and persuasion with findings, the multi evaluation method, the triangulation is preferred (Holmes 2005).

The most important aspect of the workshops is being flexible, being student oriented and teach with hands-on approach. International Covenant on United Nations Economic,

Social and Cultural Rights (OHCHR) indicates the importance of flexibility in education and the principle of flexibility is accepted to be a significant data for a child-oriented approach (Atay, 2009). In this study, the flexible education means that the lack of fixed rules regarding the approach to the subject, determination of the issues by conversing with the students and for solutions, utilization of different methods such as models, illustrations and clip art. As these methods are utilized, even materials were selected differently to cater the different socio-economic levels. Different materials are selected for the students in the private school and the public school. However this did not hinder the model making studies for the purpose of this work.

Furthermore, the difference between the studies conducted in align with the readiness level of the students at a lower socio-economic level school compared to the students in the private school also highlights the flexibility of the education. At the study conducted at the private school, a more drilled down education was possible, and the level of education is increased based on the level of the students. In addition, the studies are prepared to cater more than one area of intellect, primarily on visual intellect and in turn to favor the students who are unable to learn or learn less with verbal lecture.

Preliminary tests: A preliminary test was conducted for the study especially to determine the level of readiness of the students regarding environment. The preliminary tests included 47 open ended and 13 multiple choice questions in order to determine the environment awareness of the students (see: Preliminary test questions; Gülay Taşçı, 2014). The questions include topics of architecture and environment. When the test questions are reviewed, the percentage of success at the school with a low SEL is 31,25%, the school with a high SEL is 57,75%.

In other words, the children at the higher SEL have a higher environmental awareness before the study. As the open-ended questions are matched and reviewed with multiple choice questions for each student, this conclusion is supported further.

Table 1

Research Pattern

Research Pattern	**Pretest (Gülay Tasci, 2014)**	**Education process**	**Final test**
Control group	Readiness Scale	Traditional	Self-evaluation Scale (ecology based questions)
Experiment group	Readiness Scale	Architecture Supported	Self-evaluation Scale (ecology based questions)

Figure 1-2. Preliminary Test Phase

Workshop setup: The importance of children-oriented and constructive learning approach focused for the workshop is also indicated in Piaget's theory (Flavell, 1963). A topic that is imposed on a child by a third party will hinder the child's ability of self-discovery, a complete and permanent learning cannot be achieved. Today, the contemporary education systems refrain from providing the knowledge to the student directly but instead they facilitate the students' ability to access the said knowledge. This approach places the students at the center and structures the knowledge with their real life experiences. Therefore a higher

level of education is achieved. As Bloom (1956) specifies, with this approach the children are able to achieve stages such as comprehension, application, analysis, synthesis and evaluation, beyond memorization, and are able to utilize their knowledge more functional (Saraçoğlu, Özyılmaz Akmaca & Yeşildere, 2006). The workshop set up in align with a similar lecturing approach, the processes in which the students have structured the knowledge and the end products are evaluated with the process.

At the start of the study, the students are informed that there is no single result or a truth, each student will discover and structure her own truth and therefore not see this workshop as a written test. The aim here is to support the creative thinking of the students, and the students willingly participated to each workshop without any fear or pressure for success.

As it should be in any study that is children-oriented, the children's development features are taken into consideration when the methodology and the strategy of the study is being determined. Furthermore, based on the multiple intellect utilization, multiple methods and techniques are utilized in the studies that are centered on the children. Verbal conversations, telling through visuals, illustration, making models etc. many methods are used consequently in the same workshop structure aimed to ensure that the learning is versatile and permanent. Among the methods used, highlighting utilization of models and testing structural learning theory with this method is aimed.

For environmental education process, certain phases are to be followed (Uttke, 2012). These phases are "1. discovery and perception, 2. creating a draft and a design, 3. presentation and discussion". This phased system is also seen in structured education models. At this stage these phases are applied on the conducted study. In workshops primarily the presentations and deciphering the issue that will provide an introduction to the subject and attract the attention and increase the motivation of the students, development and design phase geared towards

solving the issue and presentation of the design and end products to the class and class-wide discussions are conducted.

Presentation Phase: At the first phase of the study, the concept of "environment", the main concept of this study is elaborated. "What is environment?, What can be done for a sustainable environment?, What is sustainability?, What is ecological architecture?, How can a building can be ecological?" these questions are asked in order to discover the concept of "environment".

Following the introduction, a more comprehensible presentation is provided on "sustainable environment and architecture".

Figure 3-4. Presentation and Informing Phase

Discussion Phase: At classroom discussion phase, in order to test whether the examples specified in the shown examples are comprehended, a problem is created comprised of weather data and input is required in order to provide a solution. Once again the ideas that are provided at this phase are written down, posted on the board and discussed with the class. At the end of this phase, instructions are provided to the children to make preparations for the subject.

Figure 5-6. Q&A and In-Class Discussion Phase

Application Phase: In this phase first of all the students are reminded about the design criteria for building an ecological structure that is in harmony with the natural environment, then the students are asked to create a simple structure (house) by these criteria, in an environment of their choosing with an issue that they determine. The topics of "the effect of climate on building typology, designing a structure harmonious with the natural environment, ecological structure design criteria, passive climatization (locating based on the sun, utilization of wind energy)" recycling rainwater, utilization of geothermal energy, waste management, recycling, insulation and heat saving in structures, natural and sustainable material utilization" specified in the presentation are some of the topics that are aimed to be reinforced with model application.

However before the model phase, at the architectural design phase, working with a sketch method is utilized. The students have translated their ideas on a draft illustration and then enhance these illustrations to models.

Through the studies the use of waste material and through it the concept of recycling is introduced to the students are highlighted.

Figures 7-8-9. Ecological Structure Works

Findings

For testing the conducted workshop, multi-evaluation process that is called triangulation by Holmes is utilized. Triangulation is elaborated as to ensure the subject of the research to be comprehended in detail by comparing and combining the different findings from different sources (Holmes, 2005). The conducted study is evaluated separately by the class teachers and study conductor and the results are compared. Furthermore during evaluation, the insights of the experts of education sciences are collected.

For self evaluation of the students, the context of the questions asked can be summarized as "the ability to question the effect of natural environment, natural events and the climate on buildings, familiarizing the sustainability concept, specifying ecological building criteria". Based on these, self evaluation of the students is as below:

Table 2

Experiment and Control Groups Self Evaluation Table

Experiment group self evaluation table							
		Low SEL (public school)			High SEL (private school)		
	CAN DO	Yes	Partially	No	Yes	Partially	No
1	"I Can Question Natural Events, Climate and Weather on Buildings"	12	5	0	11	2	0
2	"I Know the Sustainability Concept"	14	3	0	11	2	0
3	"I Can Specify the Features of	13	4	0	11	2	0

	Ecological Structure"						
Control group self evaluation table							
		Low SEL (public school)			High SEL (private school)		
	CAN DO	Yes	Partially	No	Yes	Partially	No
1	"I Can Question Natural Events, Climate and Weather on Buildings"	1	3	11	7	11	2
2	"I Know the Sustainability Concept"	1	1	13	1	7	12
3	"I Can Specify the Features of Ecological Structure"	1	2	12	0	3	17

The study with the experiment group indicate that the self evaluation questions are generally answered with "partially and yes" (Table 1). These results are in align with the portfolio evaluation and, **indicate that the students are able to convey the data provided to the** application phase.

Control group answers also include, somehow at a lesser extent, "yes and partially" answers. Since the studies are not conducted on the control group, the positive answers indicate that the children are somehow knowledgeable regarding these topics. Getting the positive answers mostly from the private school indicate that the learning that aimed to be achieved for environment education can be provided to a certain extent at private schools.

When the children are asked to specify their favorite and most beneficial method through the study, all children indicate **that the application of "model" study** is the most beneficial and their favorite. The feedback similar to these solution is obtained from the children during the study and this conclusion is further emphasized with observations.

When tutor feedback is reviewed, there are various ideas regarding the sustainable environment education and conducted workshop for experiment and control group tutors (see: Tutor evaluation questions; Gülay Taşçı, 2014). The experiment group tutors are also joined to the education studies, the control group tutors are not notified of the workshop. Based on this, **experiment group tutors indicate that environmental awareness can be taught with this workshop, control group tutors indicate that these studies are pointless and these shall be provided to train architects.** Since the control group tutors did not attend the

lecture, they fail to comprehend the relation between environment education with architecture, however the experiment group tutors that attended the lecture have provided positive feedback regarding the benefits of architecture based environment education. As a conclusion, based on the executive observation, it can be said that the experiment group tutors and students have achieved the initial goals. Many of the students were not able to define the term "ecology" prior to the study, however at the end of the study, they were able to specify the ecological structure design criteria to the letter.

Conclusion and Recommendations

In this study the potential of the environment as a learning field is highlighted and an experimental application towards environment education is conducted.

Specified by Piaget as well, the humans interact with their immediate environment from the moment of birth. The natural and built environment where the humans are present in daily life and learn subconsciously, is a rich learning field for the children. As the results of the study created with this approach is reviewed, it can be mentioned that "the children learn more with architecture based environment education about the natural and built environment, compared to traditional environment education and this education is permanent". This is achieved by utilizing architecture both in the content and the method of the education. Architecture was used as a tool for a holistic approach to the environment concept and it is understood that the environment also includes the built environment, beyond the natural formations. The greatest gain of this study is to specify that the built environment - natural environment interaction effecting the ecological balance. The children's effort to design an ecological building as a final product of this study shall be evaluated as a concrete reflection of this conscience. Furthermore, due to this training, it is seen that the three-dimensional

thinking skills of the children are enhanced, they were able to express themselves in architecture language, the ability to create a design.

Undoubtedly the tutors and the students that participate in the workshop process have a huge influence on the success. As specified by Soygeniş, "when the children look to the environment to learn, when they think more about their environment", this education will achieve its purpose. (Soygeniş and Erktin, 2009). The ensure the children not only learn to look to their environment, but to look consciously and to see their environment is the tutors' job. Graves also highlights the necessity to train the trainer and indicates the importance of "teach the teachers" program. The program with the aim to provide built environment both the teachers and the students, by creating an exponential effect via teaching the teacher and reach far more students (Graves, 1990).

In a study conducted by Kendall et al, the view of "having a built environment education for teachers is required" is being defended and most of the teachers that meet with the built environment training "are successful in using the environment as a learning material" (Kendall et al, 2007). Also, Uttke, indicating the study in which the built environment education results are evaluated, stated that "the teachers are required to be informed regarding the built environment education applications." The study conducted by National Foundation for Educational Research have provided a similar outcome (Uttke, 2012). Ensuring the studies to achieve success is not merely possible with personal endeavors. Therefore, the collective and collaborative approaches shall be adopted more in Turkey. The most important task for collaboration falls to the administrators and politicians. Having built environment education in the curriculum as a comprehensive renovation and improvement as part of a political process is the defining factor for propagation of and sustaining this education. As specified by Atay, the current values for "the goals, context and method of the education" in the current

regulation shall be taken into consideration with "politics enhancement strategies" (Atay, 2009).

Following all these general recommendations, as a conclusion exclusive to this study, it is recommended that a multi-disciplinary approach shall be adopted for environment education and architecture-based environment education approach shall be included in the national curriculum. If the relationship between the natural environment and architecture are conveyed to the children as early as possible, the awareness and conscience regarding the environment will grow at an early age (Built environment education at UIA, 2011).

In USA; "National Trust for Historic Preservation", "National Council for Preservation Education" and "Committee on Elementary-Secondary Education" have all offer the same recommendation and support addition of built environment education at early ages within the curriculum. Education authorities indicate that the best education approach to provide built environment education is to adopt in the current curriculum (Graves, 1990).

Otherwise, tutoring only the natural environment in spite of the rapidly expanding built environment, a holistic environment awareness cannot be achieved. The most concrete example of this, in Finland, the relationship between architecture and the environment is being taught to the children at pre-school stage (Gülay Taşçı, 2014). In Turkey, the first step to include the architecture within environmental education is to include the subject on various lessons. And in second stage, providing architecture as a separate lesson. While planning these education processes, to enhance the learning outcomes, teachers' and students are recommended to study with the architects and academicians to teach the 'ecology" concept multidimensionally.

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