

Effect of Experiential Learning on Built Environment Awareness: An Experimental Study on Elementary Education Students in Cairo, Egypt

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Abstract— There are indeed a huge number of Egyptian organizations that work in the field of architectural heritage preservation. But one of the major gaps in the preservation cycle lays in the perception of the common Egyptian people, which does not support the value of heritage. This paper investigates the efforts done around the world in raising awareness of elementary school pupils about their built environment, and tests this experimental approach in Egypt. The researcher tested a group of Egyptian pupils in a specifically designed workshop that introduces the primary concepts of historic buildings and then tested their perception before and after the workshop. This Experiment did in fact raise the awareness of the children towards their natural and built environment. They have gained knowledge about different building materials and architectural trends. They have as well understood facts about historic areas that surround them.

Index Terms— Architectural Heritage, Built Environment, Education, Experiential Learning, Heritage, Preservation, Public Value

1 INTRODUCTION

In Egyptian schools, architecture is not present in the curriculum as a standalone science. Some history lessons may mention the name of an architect who designed an iconic building, especially in the paranoiac era, but that is just what school children get about architecture and their built environment. Design and visual arts are only taught through drawing lessons, which most of the time depend on the teachers' abilities with no guided curriculum. Some schools organize field trips to historic sites like the pyramids and Muizz Street, or museums like the child museum or the Egyptian museum. But not all schools do it regularly and it is done on a very limited and small scale. On the last year of high school, the students have to pass an exam if they are willing to apply for any artistic college department. With no guided prior preparations.

When the arts students go to college, he is required to work with his talent, and his department and professors curriculum. Students don't get basic knowledge about their environment, surroundings, design, cities or architectural heritage [1].

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2 BACKGROUND

2.1 Hypothesis

Introducing an interactive curriculum in Egyptian schools raises their environmental awareness and promotes architectural heritage. This created awareness causes a change in attitude and behavior towards their surroundings and more positivity towards heritage related causes.

2.2 Goal

The project has two main goals, studying different approaches in heritage education in the world, and preparing a framework to be implemented at Egyptian elementary schools concerning Egyptian cultural and architectural heritage. The first goal will be achieved through theoretical study and cases. While the second goal will be reached by constructing a course that represents the measurement tool for the effect of heritage courses on the general awareness and raising public value of architectural heritage.

2.3 Objectives

Studying different approaches of heritage education in the world.

Doing workshops for students to test the best curriculum convenient for Egyptian students

Preparing a heritage curriculum for Egyptian elementary education that can be interactive, and involves children in the learning process.

2.4 Literature Review

There are many initiatives around the world that has worked on developing methods for heritage education. In 1998, The Heritage Education Network was formed in the USA by the Center for Historic Preservation at Middle Tennessee State University to be able to evaluate and develop heritage education in elementary and secondary education.

In 2000, the network published a study that stated the absence of adequate evaluation and educative material for heritage education. It stated that due to the lack of material, teachers create their own curriculum with little to no resources. The historic preservation curriculum required an evaluation that puts into consideration the nature of the course, and not be restricted to normal time spent in class or periodic exams; especially when this type of curriculum is newly introduced to students. It was stated the possibility of having an architectural curriculum added to the school syllabus with minimum creativity [2].

The class work may include introductory riddles, brief backgrounds to the story, the use of maps, Study of different factors surrounding architectural heritage, Photographs and audio-visual material, and sometimes gathering one or more strategies together in game form to reach the class aim. When children are faced with similar approaches, their interaction becomes maximum, and they become more aware and attentive of their environment and surrounding buildings [3].

Augmented Reality (AR) is a new technology, that allows the learning process to be attractive and efficient. This new technology is becoming easier and widespread everyday with the invasion of smart phones and devices; it is becoming one of the most promising approaches in modern education. Augmented Reality uses virtual environments to simulate the interaction between the user and the created indoors or outdoors environment. Mobile devices make the teaching and learning experience easier because it has the ability to interconnect students together and with their teacher inside

and outside the classroom. The technology gives teachers new tools to transfer the needed materials to students [4].

Another learning method is the Creative Drama method. It is one of the most efficient ways to get the students involved and positive in the process. They find the knowledge through observations, experiences and feelings. The process of experimentation leads to acquiring the needed material [5]. As for Museum integration in learning process, Students find it a fun and effective way of education. As they express themselves in creative Drama approach, they also find interactive display of museums as a way to learn and interact with what surrounds them [6].

When Museums are rich in displayed items and artefacts, they give the opportunity for visitors to understand the culture, art and history behind them. Some museums around the world are in fact used as parts of educational curriculums, like the Turkish Republic of Northern Cyprus (TRNC) Museum. Although museums have been noted as old and boring to elementary education students, especially that some items in display are old and broken, according to the students, museums remain an important part of cultural education, and might only need more interaction with spectators and less formality in display [6]. Today more museums are setting changes in display scenario, and incorporating more workshops, exhibitions and publications, for guided tours for students and adults. Exploratory and experiential methods are taking more place now in education in general and in museums education [7].

Architecture education for non-professionals is relatively widely spread on websites. Some websites were created to support and promote architecture, urban development, design causes and sustainability issues. Others were created to teach young children basic knowledge about their historic heritage or basic concepts of design and restoration. Some address the public while others address children. The approaches of each organization differs, some websites contain material that can be used for architectural awareness, while some promote guided tours, lectures and conferences and other public participation methods. Examples of these initiatives are the websites of the Association of Architecture Organizations (AAO), that aims to build bridges between decision makers and local communities; Architeacher that addresses the adults and children with some hands-on activities. The center of understanding the built environment (CUBE) also aims at promoting knowledge about the city and sustainability via lessons and summer camps for school kids. ArKIDecture website uses architecture as a mean to teaching visual arts, maths and science for school children through events, walks and summer camps [8].

In some countries, some schools hold workshops that help integrate the architecture education in elementary curriculum.

For example in Ireland, a day long training was held for students, where teachers partnered with professionals to convey certain notions to the students. For several months after this day, professionals helped the teachers develop many in-class activities related to space, architecture and the environment. Known architects like Daniel Libeskind even joined the training by presenting the certificates to participating schools [3]. As a result, the students had a better understanding of shapes, patterns, design and aesthetics. It was a win-win experience, as the architects have had a better understanding of school curriculums. Teachers also benefited from the training and gained more knowledge in the field, which makes them able to spread more awareness to students.

3 SUBJECTS AND METHODS

The research began with Theoretical Study and Analysis of world experience in heritage education and of Case Studies about Heritage curriculums and similar experiments around the world. Then the Experimental Part started by Getting the target of the research involved through students' workshops where techniques and strategies are tested. The students answered the same questionnaire, that the researcher constructed, before and after the workshop to test the difference in their answers. At the end the conclusion was deduced from the experiment results and discussed in light of previous research and cases.

The experimental workshop took place in Ihyaa academy, Nasr city in Cairo. The Academy is minded with training young children about their heritage as well as market skills, scientific applications and robotics. The experiment was conducted in the academy for the children from 12 to 17 years old. A group of 8-10 adolescent joined the workshop that the researcher prepared and The questionnaire, also prepared by the researcher, is tested the difference in awareness and attitude before and after the experiment.

Expected Outcome of this research can be a complete heritage curriculum formation to be implemented by the Egyptian ministry of education in Egyptian elementary classes. This outcome is a long term aim that will take further research. Also internal tourism will be encouraged when Egyptians gain

more knowledge about their important heritage. The direct outcome can be the Knowledge and awareness that the curriculum and public courses will spread in Egypt will help in an indirect way in heritage preservation in future generations.

3.1 The Experimental Workshop in Egypt

The above described tools and methods for education are what teaching science is evolving every day. Augmented reality, drama and game-based technologies are smart solutions for engaging students in the learning process.

Those techniques might be efficient, but for several reasons, might not be the ultimate solutions for the Egyptian governmental schools. The educational process in Egypt is facing real challenges in developing its techniques to reach global standards, while adapting to an old and bureaucratic administrative system, and a very limited budget for teachers and schools. The introduction of a new curriculum for heritage education is essential now that the natural and built environment is subject to massive vandalism leading to different types of pollution and defects.

The research experiment the interactive operation of learning, using affordable materials like cardboards, Lego, clay and ceramics. This technique while being affordable and easy for Egyptian calibers and teachers, train manual and motor skills for students and might also use recyclable materials and raise awareness to the issue of recycling.

The researcher prepared workshop introducing a group of students to the basics of architecture and historic buildings. They answer a questionnaire before and after the workshop to test its efficiency in changing their attitudes therefore their behavior. (Fig.: 1a, 1b, 1c, 1d)



Figure 1a, 1b, 1c, 1d: The experimental workshop held for elementary students.

The Experiment was testing the effect of a heritage course on students' knowledge and attitude towards heritage by the use of interactive but primitive (affordable) materials for Egyptian schools. This can guarantee the convenience of the course material for Governmental elementary Egyptian schools. Affordable materials included: Cardboard, shoe boxes, sticks, foam, ribbons, glues, scissors, cutters, glitters....Ceramics, mini bricks and cement and Legos.

The workshop had 4 sessions, first an Introduction to the Built Environment, then a Heritage Definition, then Architectural Elements and Building Materials, and finally Vernacular and Green architecture. In the first session they were divided into 3 groups, each made a physical model of a chosen environment (Natural, Built or both). The second session, they used a 3D puzzle of the Giza Pyramids, Sphinx and AbuSimbel Temple. The third session the students had to choose a station to work on: some chose the Lego station, others chose wooden sticks, others chose mud..etc. They built houses with the chosen materials. The last session was an open exhibition of their work; they made a presentation about what they did and discussed how they can preserve their environment.

The response of students during free play and creative processes like physical modelling and house modelling was much better than their response and engagement during Pre-set puzzles and presentation. Presentation had to be very brief in order to keep their attention. This young age 9-12 was not engaged through educational videos too.

Although they had no previous knowledge about the subject; they do not study anything related at school at this phase; they were very creative in open ended projects more than pre-defined ones. Their first project was to create, in groups, a natural and/or built environment, they designed the streets, mountains, bridges, and landscapes and built the model with the above mentioned materials (Fig. 2e). They understood the notion of scale, textures, colors and circulation. Their second project was a pre-defined puzzle of the pyramids, the sphinx and Abu-simbel Temple (Fig. 2d). Their third project was to choose a station of certain material and design one house of any type of architecture, some chose legos, others chose clay, wooden sticks and a group made a small tent with fabric (Fig. 2a, 2b, 2c).

At the end of the workshop, the children made an exhibition

and presented their work in front of their colleagues.

Statements and 7 Negative Statemnets.

- 4 Items: Open-ended questions



Figure 2a, 2b, 2c, 2d, 2e: The experimental workshop held for elementary students.

3.2 Results

The Children had to answer the constructed questionnaire before and after the course. The questions were all about the natural and built environment, what they think about old buildings, their opinion about museums, their inclination towards historic sites, their knowledge and understanding of building materials basics, some terminologies and how they understand them like “Green buildings and heritage”, What they think their role as children is towards their environment, what they would like to change about their environments and their attitude towards manual crafts vs electronic games and consoles.

Some questions were omitted after testing on an exploratory sample and found difficult or ambiguous.

The questionnaire was presented to the children in Arabic to avoid any language barrier or difficulty. It covered most major topics that were discussed during the course, and practiced hands-on each session. The questionnaire consisted of 14 question (Item), and The questions types were as follows:

- 10 Items: Yes or No Questions, Of Which 3 Positive

The scoring rationale was as follows:

Table 1: Scoring Yes or No Items.

Yes or No Items	Yes (More Positive Attitude)	No (Less Positive Attitude)	I Don't Know
Score	2	1	0

Table 2: Scoring Open Ended Items.

Open Ended Items	Excellent	V Good	Good	Fair	I Don't Know
Score	4	3	2	1	0

In Yes or No Questions: A Positive answer (A Pro-environmental Answer= 2), A negative answer (A Non-environmental Answer= 1) (Table 1).

In Open-ended questions and Fill in the blank questions, a

content analysis was conducted, and graded (4 for an excellent answer, 3 for a very good answer, 2 for a good answer, 1 for a fair answer, and 0 for a negative answer (Table 2)).

Table 3: Valid before and after scores of workshop students

Name	Age	School	Before Score	After Score
H. A.	9	Sama International	21	27
A.R.	9	British School -Al Rehab	24	23
Y. M.	10	MSE	24	30
A.M.	8	Oasis	23	18
S.K.	10	MFIS	24	28
R.S.	10	Aly Ibn AbiTaleb	10	8
A.M.	9	Mavericks	25	23
G.L.	11	Thebes Language School	22	26
F.A.	8	Nefertari	20	27
S.R.	9	Manor House	16	14
H.Aw.	10	Leaders	18	17
N.S.	10	Menese	18	22

Results showed that 6 out of 12 Students have higher grades after the course (Table 3 and Fig.: 3). On a scale 1 to 10, each student was given a score for engagement in each session; the following graph shows the degree of interest of each student on each session. Session 2 (The pre-defined activity (puzzle)) had the lowest scores by the students, whereas session 1 and 3 (The open ended models) had the highest grades among all students. (Fig.: 4a, 4b)

In open-ended questions, 50% of the children said that what they needed to change in their surroundings are the streets, to make them more clean, and the other 50%, said they didn't need to change anything to their surroundings. They had a fair knowledge of building materials specially the most used in Egypt like Bricks, Cement and Steel. Their knowledge about historic areas was also fairly good, most places they mentioned were famous touristic destinations in Egypt like: The Egyptian Museum, Abdeen Palace and the Pyramids.

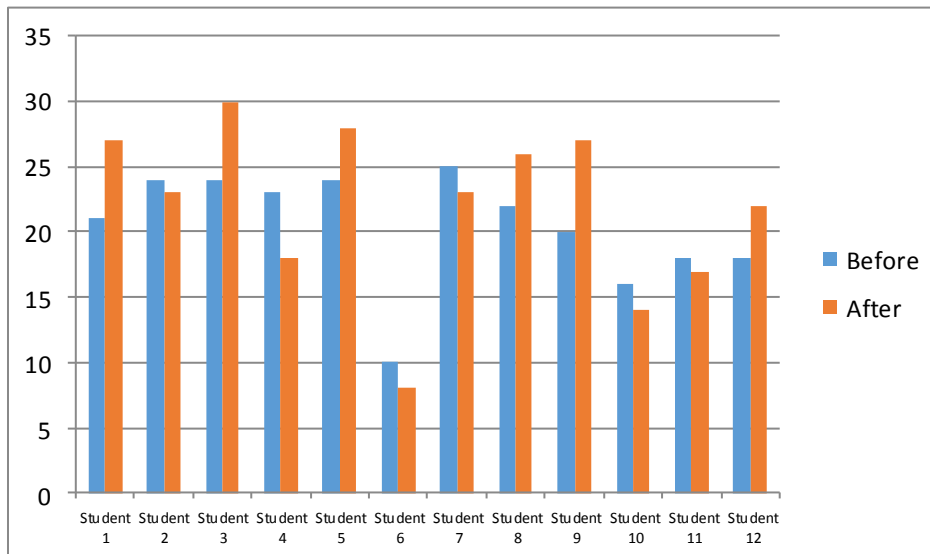


Fig. 3: Valid before and after scores of workshop students

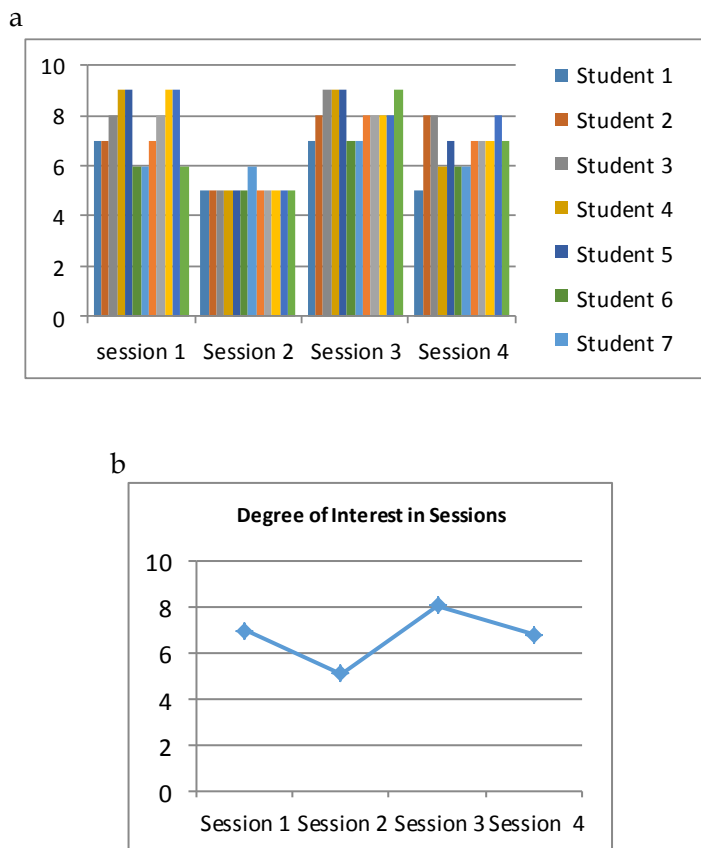


Figure 4a, 4b: Degree of interest of students in each session on scale 1:10.

4 DISCUSSION

Elementary Education is always subject to update due to its importance in shaping students. The challenging phase needs to prepare a generation that is capable of taking decisions for a better future of a rapidly growing and multi-cultural world [9]. Education should be aiming to form a personality that is able to express itself in a community and has a vast knowledge that supports their actions [10].

Theories have proven that the world of children is perceived

in the first years of their lives as from the free motion and practice, then from age 5 to 7, it is perceived through their eyes and visual images, and after that the symbols and ideas takes places of images [11]. This is what experimental research has tried to do for elementary students (age 8-12), they have been introduced to 3 Dimensional challenges and notions about their built environment that they were able to modify and create within. Researches have agreed that heritage education is a process that needs to enhance the sense of responsibility and positive participation among citizens to achieve the needed conservation goals [12] [13] [14].

Several methods has been chosen in previous researches to reach those goals, like technology, tour guided and audio-guided museums' visits [15]. Also mobile applications has been proven very efficient and handy in heritage education and simulating environments [16].

Malon et al. [17] demonstrated that games increase motivation and the will to learn, that is why games have been involved in elementary education in many subjects [18] and were also incorporated in this paper's experiment.

Other methods of teaching were stated on the European Heritage Network website like experimental excavations, seminars, dramas and exhibitions [19]. Drama has found success in capturing students' attention and releasing their creativity, and was used in the workshop as a way to pretend-play, where the kids had to pretend they were decision makers and describe what how they were going to protect the environment they have created in the first sessions. This method is common in many countries in Europe and the United States of America [20].

The importance of heritage education as a part of the sustainable preservation process has been growing in the past few years, it has the potential of reaching a wide audience that is ready to form perceptions and also it makes the efforts goes inside a systematic process that the cause of preservation currently needs [21] [22] [23]. Heritage education is, according to Copeland [21], a cross-curricular approach to the teaching of several subjects, such as history, geography, languages, and geometry, which can take advantage of heritage to augment lesson planning.

5 STUDY LIMITATION

The number of students that were interested to join the experiment was limited. Due to the nature of the non-obligatory course, the degree of absence among students was significant. Only valid results of students who attended the whole experiment's 4 sessions were calculated and analyzed.

6 CONCLUSION

Heritage Preservation efforts have been going around the world for decades now. Lots of institutions, governmental and

non-governmental, have been taking he leads to put laws and rules to protect architectural heritage and make the best usage of it to the surrounding communities. Nevertheless, the problem persists, because the users and owners of some buildings do not prioritize the value of heritage to other values like economic values for example. Recently, the heritage education notion has been spreading around the world with attempts to raise awareness to the public, using several methods that can practically affect their visions and hence their behavior. This experimental research tested the ability to change the perception of some Egyptian elementary students on their perception, it has been concluded that the course did in fact raise the awareness of the children towards their natural and built environment. They became more cautious about the neatness of their streets, as they gained the sense of responsibility. They have also gained knowledge about different building materials and architectural trends. They have understood facts about historic areas they used to see, but did not pay attention to the depth of it before applying to the experimental workshop.

As recommended in the discussion and previous research, heritage education should be encouraged in elementary schools as additional activities using a “learn through play” approach. These activities will not only raise the children’s knowledge of heritage subject, but it will be a practice to what they already learn in math, science, geography and history.

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7- UNESCO is an Egyptian organization for heritage preservation.

- Yes
- No
- I don't know

8- Name Two historic areas in Egypt that you wish to visit.....and

9- Name Three Building Materials.....,,

10- Modern buildings in Egypt take into consideration climatic and cultural environment more than old buildings

- Yes
- No
- I don't know

11- Green buildings are buildings with green colors.

- Yes
- No
- I don't know

12- As children, we have no role or responsibility towards our environment.

- Yes
- No
- I don't know

13- If you can change something about your surroundings, what would that be?

.....
.....

14- I prefer working with my hands more than electronic devices.

- Yes
- No
- I don't know

Appendix 1 Questionnaire

1- The Environmnet is composed of two parts:.....and.....

2- Only Natural Environmnet Should be preserved.

- Yes
- No
- I don't Know

3- Old Buildings are not important and should be replaced by new buildings.

- Yes
- No
- I don't Know

4- I visit museums.

- Yes
- No
- I don't know

5- Heritage means old and monumental buildings only.

- Yes
- No
- I don't know

6- I wish I can visit many historic sites in Egypt.

- Yes
- No
- I don't know

Appendix 2
Questionnaire Items Definition

Material discussed in session	Item No.	Item Type
1	1	Open Ended
1	2	Yes or No Negative statement
2	3	Yes or No Negative statement
2	4	Yes or No Positive statement
2	5	Yes or No Negative statement
2	6	Yes or No Positive statement
2	7	Yes or No Negative statement
2	8	Open Ended
3	9	Open Ended
3	10	Yes or No Negative statement
3	11	Yes or No Negative statement
4	12	Yes or No Negative statement
4	13	Open Ended
4	14	Yes or No Positive statement