

# User Preference and Input Analysis in Architectural Design and Construction Using Participatory Frameworks with Reference to a Case Study in Egyptian Primary School

Eng. Ibrahim Samy Sayed Saleh<sup>1</sup>, Prof. Dr. Mostafa Refaat Ahmed Ismail<sup>2</sup>

Prof. Dr. Ahmed Atef Eldesouky Faggal<sup>3</sup>

<sup>1</sup>Department of Architecture Engineering, Faculty of Engineering, Ain Shams University, Egypt. Orcid: 0000-0003-3204-9784

<sup>2</sup>Department of Architecture Engineering, Faculty of Engineering, Ain Shams University, Egypt.

<sup>3</sup>Department of Architecture Engineering, Faculty of Engineering, Ain Shams University, Egypt.

## Abstract

The participatory design approach is a co-design process that involves users, the local community, and professionals in the full development of the project from the generation of initial design ideas to the construction phase. This paper aims to analyze techniques for directly involving school students in the process of improving the performance of their school building elements - with an emphasis on social spaces such as playgrounds - from the design and planning phase to the implementation phase. The main goal is to develop a model for involving students in the cognitive process, which includes not only the satisfaction attained in the end, but also the problems, difficulties, and compromises that must be encountered in the co- design participatory process. This model is implemented and tested through a local case study in Cairo, Egypt where students were integrated in a participatory design strategy to improve their school playground design using the technique of atmospheric collages.

**Keywords:** Co-design framework, community based design, school architecture, participatory design, user preference.

## I. INTRODUCTION

The involvement of the students in their schools' design/upgrade through participatory based projects proves to be one of the most efficient development strategies which are based on down top concept [1]. Children form a great portion of the inhabitants' structure especially in third world countries such as Egypt, and the school plays a critical role in shaping their future. Activating the children/students in the school design process through participatory projects helps to improve and enhance the efficiency of the learning environment children encounter, which will also affect the different spaces' design and the overall perception and architectural design approach of the school building [2].

## II. PARTICIPATORY CRITERIA

Participatory criteria was done based on analysis of list of international case studies where participatory co-design strategy were implemented. The architectural design of Egyptian governmental schools and the needs of these

schools' students also affected the final phases of the participatory co-design criteria.

This proposed participatory criteria can be summarized in the following main 6 phases:

### *1st phase: professionals and children workshop*

This phase might include: interviews, collage making, acting and role play, drawing ...etc. The goal of this phase is to break the ice between the project team and the children/students, also to encourage the students to take part into the participatory process and to freely express their needs and dreams.

### *2nd phase: Adults/staff workshop*

This phase might include: interviews, activity diagrams, functional & educational aspects survey...etc. The goal of this phase is to activate and engage the school teachers within the project, to get their perception about the school design and how to include their students within the project itself, and to use their experience of dealing with the students and their observations on their behavior.

### *3rd phase: Professionals/project team design proposals/alternatives*

This phase will be done based on the input and gathered data from the previous two phases.

### *4th phase: children/students & teachers proposals presentation/feedback*

The goal of this phase is to get all involved parties to evaluate and discuss the progress and the results of the participatory strategy/project, and to give their input in order to achieve decisions about progressing in the project or going back to a certain previous phase in order to reach more approved results.

### *5th phase: Finalizing design & building*

Based on the input and the results from the last phase the project team can start finalizing and building.

### *6th phase: Project monitoring, maintenance, and after project strategy*

One of the main goals of any participatory project is to have a

long term and sustainable criteria that ensures the success of the project and its adaptability/durability for long term time span. The nature of any participatory project and the local conditions facing it will definitely results in changes in any phase's strategy by adding, adjusting, or skipping certain phases in order to reach the most suitable strategy.

### III. LOCAL CASE STUDY

Egyptian public schools are mainly standardized school buildings, which are implemented all over Egypt by the general Authority of Educational Buildings (GAEB). The GAEB is in charge of designing, building, and maintaining schools in Egypt. The design generally provides a multistory building with a corridor in the middle, and standardized, identical classrooms on each side of the corridors. The standardized design was mainly developed after the earthquake in 1992, in order to build as many schools as possible in short time to serve the emergency need. The typical classroom is usually forty square meters, rectangular, and furnished with fifteen to twenty benches and desks, which are often fixed to each other. The classroom is occupied by forty to sixty students squeezing themselves on benches, which means that each child has less than one square meter to learn, move, and play. [3]

#### • El Kods Primary school in Ard El-Lewa Introduction

One public primary schools in Egypt - Greater Cairo city was selected; El Kods Primary school in Ard El-Lewa. El Kods Primary school is a typical standardized governmental school housing more than four thousand student in the same L-shape four story building. The school is located in Ard El-Lewa district which can be classified as an 'informal' district in Cairo, which developed over agricultural land over the last thirty years with mainly low-income and some middle-income inhabitants.

In the case of informal settlements the government faces the challenge of providing public services and infrastructure buildings within these communities which we can argue that because they are not planned they weren't considered in the short term or long term development strategies. And within the current economic crisis; the standardized 'low cost' school design is once again used, but now it is not used after an earth quake but used to serve the emergency need of schools to serve the rapidly growing informal settlements' inhabitants.

Considering all the previous aspects; the result in El Kods School is a standardized low cost durable school building, with overcrowded square classes and 'no' spatial quality or design consideration for an improved learning environment. Another element is the school's courtyard which is a plain open space with no furniture or shading elements, and mainly used for assembly and break time. The role of the school in this case is very important as it must provide the student with some quality time and space while learning to give him a break from the 'brutal' informal built environment which he/she encounters every day. Also the role of the school's courtyard as a 'rare' open safe space for the students to play

and spend time, as it might be difficult to find similar open spaces in the informal dense urban fabric of Ard El-lewa.



**Fig. 1.** El kods primary school standardized design (Photo: Mortiz Bellers)

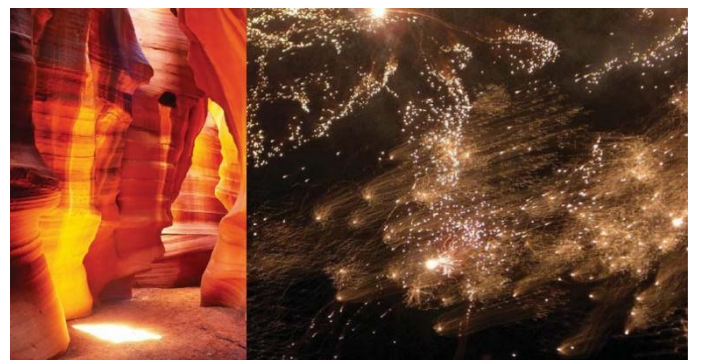
#### • Forming Teams \ Matrix of Participation

When we talk about a project with various parties involved, it becomes a challenge how to effectively activate the full potentials of each party to achieve successful sustainable results. In our case study the parties involved in the participatory project were the project architects' team (including university students and architects from Egypt and Germany), the school's teachers (3-5 teachers), and the school's students (15-20 primary student).

There were different overlapped levels of participation within the project organizers themselves with their common and different expertise and background, then there was the coordination and working with the architecture students from Egypt and Germany as well and how to get them to work with the school's students within a participatory process, and finally there was the work within the two schools and with teacher and school's students.

#### • Create Your Dream Playground (the Technique of Atmospheric Collages)

The participating architecture students were asked to bring a collection of paper printed photographs of non-architectural context that illustrates specific atmospheric qualities and spatial qualities like (warm, cold, glowing, sparkling, gleaming, prickly, hazy, pale, soft, hard ...etc.) to be discussed with the pupils.



**Fig. 2.** Samples of required photographs (Poster by: Vittoria Capresi and Barbara Pampe)

Figure 02 illustrates an example of the required photos where the photo on the left side might represent keywords like 'warm, full of light, clear' and the photo on the right side might represent keywords like 'quick, shiny, cold, glittering'.

The collected photos were then introduced to the children at both schools with the summer school team introducing themselves and explaining to the children why they are here and what they expect from them to do through the whole project and with these photos. The team made sure to clarify to the children and teachers that they also can feel free to contribute to the process itself.

The team and children were mixed into groups, and the architecture students were observing and mentoring the children in order to form more deep understanding for their photo collages, their needs, and their dreams as illustrated in figures 03.

The children were provided with tools and blank papers to help them making their dream collages, the team also made sure to help the children –if needed- if any of the children face any difficulties to express or use the images. It was very essential especially for the shy children who face problems in collecting the photos for their collages or hesitate to take the initiative to do what they want to what they think the supervisors expect from them. All of these factors were critical to consider in the project strategy considering the fact that this was the first time for the children in the selected schools to experience this kind of participatory projects.

Every student/child was asked to give a title to his/her collage and then tell a story about his/her dream playground and how it's represented in the collage.

The participatory team focused also on gathering as much data as possible about the spatial qualities, textures, colors, and any physical qualities the students prefer or image that it exists in their dream playground.

Every student/child was asked to give a title to his/her collage and then tell a story about his/her dream playground and how it's represented in the collage.

The participatory team focused also on gathering as much data as possible about the spatial qualities, textures, colors, and any physical qualities the students prefer or image that it exists in their dream playground.



**Fig. 3.** Students choosing the photos for their dream playground collage in ard el-lewa school (Photo: Dina Samir)



**Fig. 4.** Student collage presentation (Photos: Dina Samir)

The students did the presentation about their collages with sometimes the help of his/her mentor if needed. There was some sort of open discussions during the presentations in order to gain more understanding of children needs. The teachers in both schools attended the whole process and the children's input was discussed with them.

The students did the presentation about their collages with sometimes the help of his/her LMPG mentor if needed. There was some sort of open discussions during the presentations in order to gain more understanding of children needs. The teachers in both schools attended the whole process and the children's input was discussed with them.

After the presentations the participatory architects team gathered the collages done by the children and started to write down their impressions, brain storming of ideas, and how can the team transform the children's dreams into a physical built environment/playground.

The first step was to transform their stories into physical actions using simple keywords like: retreating, observing, climbing, relaxing, hiding, flying, jumping, resting, gathering, sitting, chatting, sliding, snuggling, sensing, chilling, ... etc.

The second step was to form groups of keywords which can work together in order to start working on how each group will be transformed into playing and learning built elements into the schools' courtyards.

An example of the collage stories in Shubra School was; Sea Wonders by school student Amira (figure 05);

"I love the undersea world, with the colorful fishes, and I love to swim with them. I also like to look at the bubbles because of their shapes and colors. I am in the middle of fishes, they are around me, but I am in a bubble, like this one. In the lower part, I see lot of people building their houses, in the shape of cubes, and everyone is inside a cube." Student Amira.

Some keywords were fitting to this story such as; hiding, retreating, and observing.

Another example was; To Swim and Climb and Sleep and Relax and Hide and Climb! by school student Bassam (figure 06);

"I like to swim here in the water and I like to climb here the



mountains. Then I can relax and hide under the trees, and finally climb again until the sky. I like the sky!" Student Bassam.

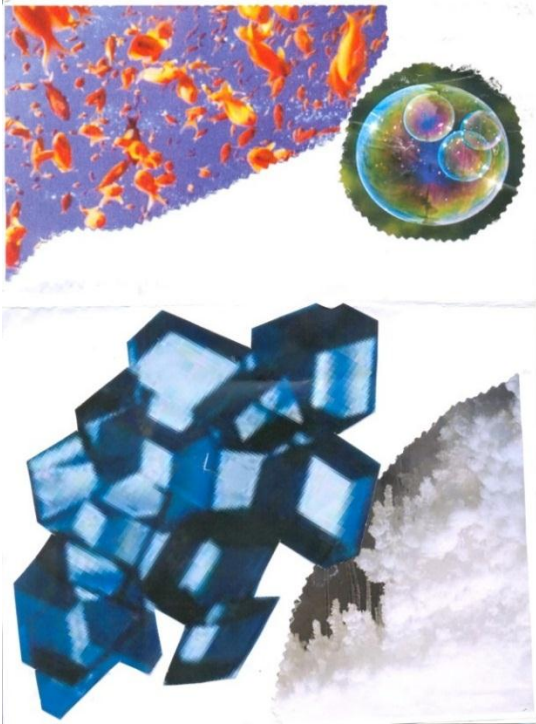


Fig. 5. Sea wonders collage by Amira (Photo: LMPG Team)



Fig. 6. to swim and climb and sleep and relax and hide and climb! collage by Bassam (Photo: LMPG Team)

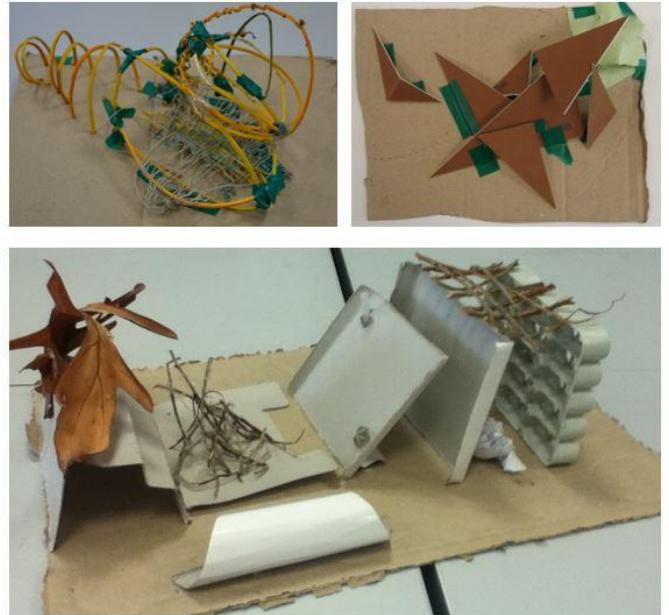


Fig. 7. First idea model samples based on students' collages (Photos: Dina Samir, Akram Mohamed, and Omar Kassab)

#### IV. TRANSFERRING INTO DESIGNS

- **Phase One: Physical Dreams**

The architecture students were asked to transform the collages and the stories of the students they mentored into physical models. They were asked also to use any material available and they find suitable. The goal at this phase was to be free constrains such as structural matters, cost, and dimensions ...etc. in order to get started, fully activate the potentials in the students' collages, and transform actions into physical objects.

Various design proposals were done – samples are shown in figure 07 - expressing the different spatial qualities and the different experiences such as; discovering, exploring, conquest, dark spaces/cave, switching, private space, expecting, observing/setting above, waiting, diversity, chain intersection ...etc.

These qualities and experiences illustrated in the models were explained and achieved through a description of actions within the spatial designs like; sitting above or beneath, hiding under or behind, climbing up and down, jumping ...etc.

- **Phase Two: Design within the School Setting**

In the previous phase the architecture students were investigating and designing different proposals which represent their interpretation of the transformation of keywords adapted from the collages into a physical geometry/space.

This phase goal was to divide the architecture students into design groups in each school. The students with common or matching keywords formed a design group with each other like the hide and relax team or the jump and climb team ...etc.

Each group was asked to develop a common idea/proposal which they have also to propose a suitable location for it

within the selected school. The selected location should be enhancing and suitable for the intended implementations, for example; a corner for hiding and sitting, or a wall for climbing ...etc.

The new implantation should take in consideration also the available construction materials (bricks, cement, sand, gravel, and wood in both schools with extra donated concrete tubes in Ard El-Lewa School).

• **Phase Three: Children and Teachers Presentation and Feedback**

The team presented the result of the design proposals in both schools for teachers, school director, and children. The design methodology and process of transforming the collages into design proposals were explained.

The teachers were also involved in the implementation criticism and in its proposed location within each school. The aim of involving teachers was to maximize the learning through playing part. The Teachers provided a better understanding for the existing teaching environment, the existing problems and potentials, and their perception of how they will manage the implemented designs.

The design ideas were presented using physical models for intended implemented objects and a school physical model. The school physical model made it easier to explain the ideas to the children and teachers as well as illustrated in figure 08.



**Fig. 8.** Children and teachers presentation/feedback in Ard El-Lewa (Photos: Maria Theresa).

**V. FINALIZING DESIGNS/ BUILDING**

After the discussions and feedback from the children and teachers in the school; the teams were asked to start to do the final adjustments and start developing construction and structure proposals for their designs. In the final design phase the durability and safety measures should be considered, also the allowed time frame for building (three days) affected the final design results (in size and amount of suggested objects,

with –again- careful consideration for safety measurements, shading, and agreed functional suitability/zoning.

The children were involved in the building phase as well in order to create some sort of personal ownership and commitment towards the new objects by the children.

**V. VI. PARTICPATORY CO-DESIGN MODEL PROPOSAL BASED ON LOCAL CASE STUDY RESULTS**

Table 01 summarizes the main phases of the participatory strategy divided into main 4 strategies. Each strategy has its participatory methodology as follows:

- Workshop with children using atmospheric collages, using participatory methodologies: Create your dream playground, Collage presentation, and Collage analysis.
- Workshop with teachers, using participatory methodologies: Activity/functions diagram.
- Transferring into designs, using participatory methodologies: Physical dreams, Design within the school setting, and Children and teachers presentation/feedback.
- Final stage, using participatory methodologies: Finalizing design proposals, let's build, and Final results.

Based on Table 01 and the suggested six participatory design phases a survey was done in order to evaluate the different suggested criteria and guidelines and compare it to the theoretical relative weights.

The survey structure was targeting professionals including architects, social workers, and teachers. The results from the survey were then analyzed in table 02 and it was also compared with suggested participatory guidelines relative weights in table 03 based on analysis of international case studies and actual case studies results in table 04 to evaluate the project participatory process components, relative importance/weights, and overall results.

**TABLE 1.** Selected Schools Participatory Strategy Summary

Participatory Strategy	Participatory Methodology
Workshop with children using atmospheric collages	Create your dream playground
	Collage presentation
	Collage analysis
Workshop with teachers	Activity/functions diagram
Transferring into designs	Physical dreams
	Design within the school setting
	Children and teachers presentation/feedback
Final stage	Finalizing design proposals
	Let's build
	Final results

**TABLE 2. Participatory Co-Design Guideline Criteria for School Survey Results**

guideline	children workshop			Teachers Workshop	transfer into design						criteria	total load
	<i>dream playground</i>	<i>collage presentation</i>	<i>collage analysis</i>		<i>activity diagram</i>	<i>physical dreams</i>	<i>school setting</i>	<i>feedback</i>	<i>finalizing</i>	<i>building</i>		
participatory process	3	3	3	2	6	6	3	3	3	1	prescribed	33
	6.67	6.67	6.67	3.33	3.33	3.33	3.33	3.33	3.33	4	assigned	43.99
	8.18	8.18	8.18	2.72	1.81	1.81	2.72	2.72	2.72	8	invited	47.04
	3.33	3.33	3.33	2.22	2.22	2.22	4.44	4.44	0	8	negotiated	33.53
	4	4	4	0	0	2	2	2	2	10	self-initiated	30
	1.67	1.67	1.67	3.33	0	0	5	5	0	10	graduated	28.34
	2	2	2	4	2	2	7	7	4	10	collaborative	42
explorative learning	4.54	4.54	4.54	5.45	4.54	4.54	6.36	6.36	4.54	8	observation	53.41
	5.54	5.54	5.54	5.54	3.63	3.63	7.27	7.27	3.63	8	exercising	55.59
	5.54	5.54	5.54	3.63	3.63	5.45	5.45	5.45	3.63	9	space research	52.86
school curriculums	5.45	5.45	5.45	4.54	3.63	3.63	5.45	5.45	2.72	10	applied	51.77
	2.72	2.72	2.72	5.45	6.36	6.36	5.45	5.45	4.54	10	children space dialogue	51.77
local environment	5	5	5	5	5	5	4	4	3	10	outdoor	51
	3.36	3.36	3.36	5.54	9.09	9.09	6.36	6.36	3.63	3	indoor	53.15
	10	10	10	5	5	5	6	6	7	10	adaptive	74
local culture	6.36	6.36	6.36	6.36	4.45	4.45	5.45	5.45	1.81	10	school role	57.05
	4.45	4.45	4.45	7.27	6.36	6.36	5.45	5.45	6.36	10	local community	60.6
	4	4	4	6	6	6	4	4	4	10	gender	52
place experience	5	5	5	7	5	5	8	8	5	10	workgroup	63
	2.22	2.22	2.22	6.66	6.66	6.66	3.33	3.33	4.44	9	learning	46.74
	2.87	2.87	2.87	4.28	5.71	5.71	4.28	4.28	2.85	10	leisure	45.72
	2.22	2.22	2.22	2.22	8.89	8.89	4.44	4.44	4.44	10	space geometry	49.98
	5	5	5	1	6	6	7	7	4	10	spatial perception	56
emotional significance	6.36	6.36	6.36	2.72	3.63	3.63	3.63	3.63	3.63	8	own creation	47.95
	3.63	3.63	3.63	2.72	5.45	5.45	8.18	8.18	3.63	10	school of dreams	54.5

	5	5	5	2	3	3	3	3	5	10	space memory	44
user imagination	9.09	9.09	9.09	3.63	4.54	4.54	3.63	3.63	1.81	9	children form environment	58.05
	6	6	6	2	4	4	6	6	4	9	manipulation	53
temporal aspects	2	2	2	4	7	7	4	4	6	9	ownership	47
	3.63	3.63	3.63	6.36	5.45	5.45	6.36	6.36	4.54	10	users/activities	55.41

**TABLE 3. Participatory Co-Design Guideline Criteria for School based on Literature Review Analysis**

guideline	children workshop			Teachers Workshop	transfer into design						criteria	total load
	<i>dream playground</i>	<i>collage presentation</i>	<i>collage analysis</i>		<i>activity diagram</i>	<i>physical dreams</i>	<i>school setting</i>	<i>feedback</i>	<i>finalizing</i>	<i>building</i>		
participatory process	1	1	4	6	1	1	1	1	4	1	prescribed	21
	4	4	5	6	2	2	2	4	6	4	assigned	39
	8	8	8	8	8	8	8	8	8	8	invited	80
	10	10	8	10	10	10	8	10	10	8	negotiated	94
	10	10	10	10	10	10	10	8	8	10	self-initiated	96
	10	10	10	10	10	10	10	8	8	10	graduated	96
	10	10	10	10	10	10	10	8	8	10	collaborative	96
explorative learning	8	8	10	10	9	7	9	8	6	8	observation	83
	8	8	9	9	9	9	6	9	8	8	exercising	83
	8	9	10	7	10	8	8	9	9	9	space research	87
school curriculums	5	5	10	10	10	10	10	10	8	10	applied	88
	5	5	10	10	10	10	10	10	8	10	children space dialogue	88
local environment	7	7	10	10	10	10	9	9	9	10	outdoor	91
	3	3	5	8	5	10	4	5	5	3	indoor	51
	5	5	10	10	10	10	9	9	10	10	adaptive	88
local culture	10	10	10	10	10	10	10	10	10	10	school role	100
	10	10	8	6	10	10	10	10	10	10	local community	94
	10	10	10	10	10	10	10	10	5	10	gender	95

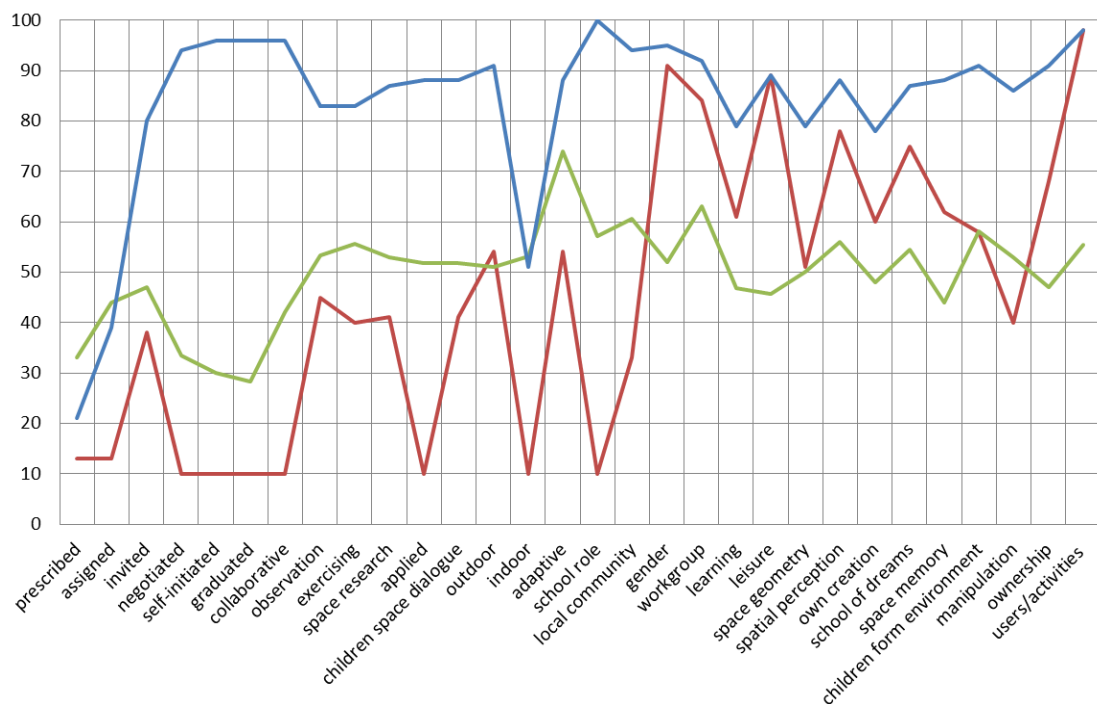
place experience	7	9	10	9	10	10	9	9	9	10	workgroup	92
	6	6	8	8	9	8	8	8	9	9	learning	79
	10	10	9	9	9	9	8	8	7	10	leisure	89
	7	7	10	5	10	8	6	8	8	10	space geometry	79
	10	10	10	5	10	9	7	9	8	10	spatial perception	88
emotional significance	10	10	8	5	8	8	6	7	8	8	own creation	78
	10	10	10	6	9	8	7	9	8	10	school of dreams	87
	10	10	9	6	10	8	9	7	9	10	space memory	88
user imagination	10	10	9	9	9	9	9	7	10	9	children form environment	91
	9	9	10	7	9	8	8	8	9	9	manipulation	86
temporal aspects	10	10	10	8	10	8	10	8	8	9	ownership	91
	10	10	10	10	10	10	10	10	8	10	users/activities	98

**TABLE 4. Participatory Co-Design Guideline Criteria for School based on Case Study Results**

guideline	children workshop			teachers Workshop		transfer into design					criteria	total load
	<i>dream playground</i>	<i>collage presentation</i>	<i>collage analysis</i>	<i>activity diagram</i>	<i>physical dreams</i>	<i>school setting</i>	<i>feedback</i>	<i>finalizing</i>	<i>building</i>	<i>results</i>		
participatory process	1	1	4	1	1	1	1	1	1	1	prescribed	13
	1	1	1	1	1	1	1	1	1	4	assigned	13
	8	8	1	1	8	1	1	1	1	8	invited	38
	1	1	1	1	1	1	1	1	1	1	negotiated	10
	1	1	1	1	1	1	1	1	1	1	self-initiated	10
	1	1	1	1	1	1	1	1	1	1	graduated	10
	1	1	1	1	1	1	1	1	1	1	collaborative	10
explorative learning	1	1	1	10	9	7	1	1	6	8	observation	45
	1	1	1	1	9	1	1	9	8	8	exercising	40
	1	1	1	7	10	1	1	9	1	9	space research	41
school curriculums	1	1	1	1	1	1	1	1	1	1	applied	10



	1	5	1	10	1	10	1	1	1	10	children space dialogue	41
local environment	1	1	1	10	10	10	1	9	1	10	outdoor	54
	1	1	1	1	1	1	1	1	1	1	indoor	10
	1	1	1	1	10	10	1	9	10	10	adaptive	54
local culture	1	1	1	1	1	1	1	1	1	1	school role	10
	1	1	1	6	1	1	1	1	10	10	local community	33
	10	10	10	10	10	10	10	10	1	10	gender	91
place experience	7	9	10	9	10	10	1	9	9	10	workgroup	84
	1	1	8	8	1	8	8	8	9	9	learning	61
	10	10	9	9	9	9	8	8	7	10	leisure	89
	1	1	10	1	10	8	1	8	1	10	space geometry	51
	10	10	10	1	10	9	1	9	8	10	spatial perception	78
emotional significance	10	10	8	1	8	1	6	7	1	8	own creation	60
	10	10	10	1	9	8	7	9	1	10	school of dreams	75
	10	10	9	1	10	1	1	1	9	10	space memory	62
user imagination	10	10	9	1	9	1	1	7	1	9	children form environment	58
	1	1	1	1	9	8	1	8	1	9	manipulation	40
temporal aspects	10	10	10	1	10	8	1	8	1	9	ownership	68
	10	10	10	10	10	10	10	10	8	10	users/activities	98



**Fig. 9.** Overall comparative participatory guideline criteria load distribution based on survey results highlighted in green compared to actual school results – highlighted in red – and assumed results before the case study – highlighted in blue

Figure 09 illustrates the comparison between the theoretical assumed data in blue, the survey data in green and the schools' data in red. The charts indicate that the assumed theoretical weights proved to be very optimistic and relatively got high values for the total load of each different participatory criteria guideline. On the other hand the values from analyzing the results of the case study proved to be similar to the values from the survey in almost half of the guidelines, and in the other half the values were higher than the values of the survey which can be justified because of the nature of the participatory process which took place in the selected local school, also because of the community and culture which resulted overall in higher values for gender, space perception, own creation, school of dreams ...etc. guidelines as students in this local school seem to lack these qualities/guidelines in their learning environment/school which resulted in more focus on these qualities/guidelines in the aim and results of the design/upgrade participatory strategy for the selected local case study.

## VII. CONCLUSION

The main goal of this study was to analyze the participatory process which resulted into an upgrade for the courtyard in the selected school. The process itself can be adapted to fit the other spaces/functions within the school complex. The final results can't actually be considered as 'final' but more likely as prototypes for playing and learning objects within a participatory design strategy.

The different approaches in each of the children workshop phases demonstrated the strength and weaknesses in each choice. The technique of atmospheric collages where the children were provided with abstract images to create collages, they were free and creative in their collages but it was a challenge to transform these very abstract collages into spatial design proposals.

The involvement of other parties other than the children proved to be useful for the project as it helped with providing the local materials through the support of the local material suppliers, a better and more elaborated understanding of the school situation was gained through the interaction with teachers and community, and the cooperation between the local craftsmen and professionals from the participatory team resulted in advanced modifications and customization to building techniques and participation strategies onsite such as; brick construction techniques, foundation and structure for wooden elements, the implementation location and durability according to the children expected use, and the final design and construction decisions regarding the heights and coloring ...etc.

Participatory co-design school guideline can also be used as a tool of design strategy planning and also as an evaluation tool, as it shows which criteria was chosen in the participatory design strategy and how effective these criteria were activated in the selected example by comparing the original criteria matrix to the new one.

These guidelines can be adapted to fit different educational environments and facilities. In the current study the guidelines

were used for analyzing the participatory strategy in designing and upgrading school courtyards.

## REFERENCES

- [1] M. Dael, J. Helmer-Petersen, P. Grønbech, P. Rasmussen, M. Madsen, *Architecture and Design for Children and Youth*. Copenhagen: The Network for Children and Culture, 2011, ISBN: 978-87-92681-25-6.
- [2] M. Dudek, *Children's Spaces*. London: Architectural Press, 2005, ISBN: 0 7506 54260.
- [3] V. Capresi, and B. Pampe, *Learn Move Play Ground - how to improve playgrounds through participation*, Berlin: jovis, 2013, ISBN: 897 3 86859 224 5.
- [4] END OF THE ARTICLE.