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SEARCH OF INNOVATION IN EDUCATION ENVIRONMENTS

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Abstract:
In school design studying spatial qualities, which are in harmony with the education programmes' goals, is important for creating physical conditions that support associated education process. In new learning approaches it is emphasized that there is no single learning method, that it is necessary to find different methods for learning in schools, and that there is a need to search for new education environments for learning. In this respect this study aims to examine new architectural examples, which are in harmony with the goals of contemporary education approaches, and to shed light on designing new educational buildings as a result. In the scope of this work the approach to schools and opinions that are effective on learning are mentioned briefly, expectations from school architecture are defined, and examples from innovative education environments, which are made to give necessary usage capabilities required by new education approaches, are presented. When the examples are examined its can be seen that flexibility is the primary design criteria and the second important criteria is related to the contribution of the building to awareness on sustainability.

Keywords: modern education, open plan, learning studio, advisory based plan, small learning community, mobile classroom

Introduction

Education is the cornerstone of social development; which is why new education approaches are questioned and considered in order to improve qualifications of education at all stages. An important factor in the success of education programs is that

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physical environment should respond to requirements of those programs. That condition also requires the search for spatial qualifications proper to the purposes of education programs in schools. In recent years, lots of educators study on the subject of how children can learn in the best way in new learning approaches and define the preconditions to accomplish that which are validated from very beginning of preschool education until different phases of elementary and secondary education.

The best learning methods in such studies are;

- Learning with different age groups,
- Learning from different people (team work, collaboration),
- Learning in different places (utilizing the whole society as a learning environment),
- Learning different things (distinguishing),
- Learning with different ways (project base),
- Learning at different times (block time)

In that context, it is accepted that new spatial organizations based on serial of new learning values and new models are required. The significant emphasis in new learning approaches is that there is not an only single learning way. For instance, Prakash and Fielding (2007) define 20 different learning styles which some of them are "independent study, naturalist/outdoor learning, social/emotional learning, art-based learning, and design-based learning". It is not a necessity to put together all the learning styles under one roof of education space; however, new learning environments should be developed to answer such diversity (Lackney, 2009a; Prakash and Fielding, 2007; Nair, 2014).

As literature is analyzed, flexible plan-based school design approaches are seen which enable different learning environments to exist at the same time. Despite of such approaches, usually designs of elementary and secondary structures are still based on traditional learning approach. It is accepted that reconstructing the present structures in accordance with the changing learning approaches is not easy due to economic conditions. In that context, as a solution; different small-scale spatial solutions are joined to school structures so that the structures can respond partially to the requirements of modern education process.

Both approaches; searching for new school models and developing small-scale additions, are adopted in order to create physical environment that responds to new education approaches which are valid at the present time. In that regard, as the subject is considered specific to Turkey, it can be said that although new methods are considered in education, there is not enough innovation research in terms of physical environment. The purpose of that study is to present samples of new architecture applications which are produced regarding the goal of improving education process

and make contribution for constructing different organizations in that area. In this study, primarily the opinions regarding the approach to schools and learning process of nowadays are summarized; then the expectations from school architecture are explained and the examples of education environment which are designed for the spatial requirements of new learning approaches are presented.

Intellectual Changes on School and Learning Perspective in the Beginning of 21st Century

21st century is defined as an informatics century, the impacts of science and technological developments on the purpose of educations and function of schools are analyzed. Studies are made on the notion that each institutions need to become a learning institution and extending the learning capacity of such institutions are aimed (Özden, 2002). In that respect, an environment is described that is a learning school, the children are active, the importance is on learning instead of teaching, the learning with collaboration and team work are encouraged (Töremen, 2003). It is also believed that learning school shall be replaced by learning networks in the future. So, it is considered that strict lines among teacher, student, parent, education and life; and lines among school and society shall become blurred (Tekeli, 2003). An important concept of the present days is globalization. In that context, the need to raise a person who can be successful in different cultures and geographics is emphasized. In order to accomplish such perspective, a new school definition that accepts the whole environment as a learning space is required. Lifelong education understanding can be adopted only if the idea that the information cannot be acquired only by teachers in schools; hence, means and methods should be different from traditional ways. In multi-channel education, school is not accepted as the only place to acquire the knowledge (Oktay, 2001).

In modern education, an approach that adopts learning and learner instead of teaching is considered. Active learning and doing during learning process, learning by living are considered as important; a student growing with research, observation, interpretation and implementation skills, and transferring the learning process across the school boards are required in that regard (Oktay, 2001). An importance is attributed to students learning to be respectful to diversities and personal rights during education process; and in that frame, democracy education becomes a requirement. Educators make emphasis on the importance that democracy should become a life value and on the focus of moving away from individual-consciousness to us- consciousness (Aydın, 2001; Çağlar, 2001). The concept of accessibility is significant in terms of everybody being able to reach educational opportunities. Thus, no limitation shall be accepted before freedom of access the knowledge.

Another significant subject in that regard to raise successful individuals in new century is the development of talents. An emphasis is made to individuals to gain "communication, collaboration, research, healthy life style, production and consumption competence" skills. In that respect, "intellectual, individual and social" qualifications which are considered in individuals are clarified. Accordingly, an individual should have "analysis synthesis, creativity, problem solving, developing constructive criticism" skills in terms of intellectual qualifications; "self-esteem, self-motivation" in terms of individual qualifications; and "positive communication ability, being open to collaboration" in terms of social qualifications (Aydın, 2001; Çağlar, 2001). The most important skill regarding intellectual qualifications is creativity. As it is considered that creativity is a natural-born ability, a child should be able to live in an appropriate environment in order to explore and develop such ability; and also a child should be provided with the opportunities to be able to try authentic ways so to develop expected behaviors and skills (Oktay, 2007; Toğrul, 2007).

Theory of Multiple Intelligence of Howard Gardner who argues that individuals have different abilities brings new perspective to education process and is accepted in that field. Gardner argues based on his first study made in 1983 that there are seven types of intelligences which are differently strong in individuals. Linguistic, Logical-Mathematical, Bodily-Kinesthetic, Spatial, Musical, Interpersonal, Intrapersonal are first seven types of intelligences which later Gardner added Naturalist intelligence to the list. He continues his study on the ninth intelligence, which is Existential intelligence (It is accepted that skills can be recognized, knowledge that is expected from children to have and the abilities can be promoted if team works in classrooms essentially are based on skills as the reflection of the theory. Gardner's theory argues that educators are moving away from conventional learning and teaching methods, and turn for lots of new searches in the classrooms (Pound, 2006; Gardner, 2004, Prakash and Fielding 2007; Taylor, 2009).

Creativity and intelligence are not accepted as the same by Gardner. He argues that people have one or two dominant skill; and a total creativity is not possible. The practice of that approach was realized lengthily in "Project Zero" or "Project Spectrum" by lots of academicians. In the study, it was accepted that every child has a specific profile with different abilities or has multi-intelligence; hence, education environment should be enriched by generous sensual materials and activities (Pound, 2006). Gardner's theory has its reflection on education process in terms of supporting child development at all aspects (Wortham 2002). It is important to create functional diversity required for development of different intelligence stated in the theory. As Theory of Multiple Intelligence is applied in schools, the opportunities shall arise to understand direction of children interests and empower their intelligence areas. In that respect, for

example a student (using cognitive intelligence) who has difficulties to learn something in conventional classroom can easily learn the same thing by a performance (bodily/kinesthetic, spatial/musical intellectual) (Prakash and Fielding, 2007). Hence, it is expected from schools to have physical opportunities providing functional diversities.

School Architecture: Comply with Change

Learning and teaching environments in the traditional education process, need a uniform spatial organization. Teacher was transferring information to students in a linear structured classroom in conventional teaching methods used in the past. The school structure of that complies with such system is defined as "Ford Model" and it is accepted as the basic design of a classroom. Classrooms are located next to each other on a long hallway; so that children could pass in short amount of time among classrooms as considering 45 minutes of lectures of a day. As a result, the search for different spatial needs did not arise within such system. (Lackney, 2009a). Most of schools at present are structured in the direction of that system. However, a hallway loaded from both sides of 20th Century is not valid for schools of 21st Century. Prakash and Fielding (2007), define classrooms as the most visible symbol of education philosophy. In each study which argues about school designs of future focuses on classroom design as the most related subject within the argument. A spatiality where students can study individually and can direct their own learnings is sought in school designs regarding new education approach. Required forms for new spaces where children can study in collaboration can be realized by creating changeable size space and arranging the same space for various learning activities (Wolff, 2001). The search for flexibility becomes an important condition for designing new education environment.

Education in 1920's and 1930's was defined as progressive era. In that era, educators and psychologists suggested teaching methods for preschool and elementary schools; studies which are more child-centered and promote meaningful education style were published. In these studies, subjects like establishing a bond and collaboration with community in learning process for children to be able to realize their real potential in schools, reflecting diversities of the real world and enriched education programme, and existence of different functionalities were questioned (Dudek, 2002; Wortham, 2002). Contrary to traditional education, Dewey's new education approach; "Progressive Education Theory" started to become important during 1930's and 1940's. The foundations of the approach are expression and development of individuality, freedom of act, learning through experiences, developing skills directly by relating,

getting the most out of the opportunities of present day other than making preparations for far future and also acquainting the changing world (Dewey, 2007; Wortham, 2002).

It is expected from nowadays schools to promote learning activities in inner and outer space by interaction of teacher and student with each other; which is totally against to traditional learning system where children are listening teachers in stable position. As it is mentioned before, that is why flexibility in schools becomes an important criteria. It is adopted that flow of information in modern education system can be realized by different means like "project management, independent learning, field works as sensual methods, role plays, scenario methods and workshops". Using such creative and open learning forms makes compulsory for school to have different spatial conditions and implementations (Walden, 2009).

Gardner's Theory of Multiple Intelligence has its impact as a necessity on school architecture; meaning that, different intelligence areas should find its reflection on spatial reactions. For instance, drama classes and multimedia communication centers are must to reflect linguistic intelligence in schools; for bodily/kinesthetic intelligence, playfields, dance studios and spaces for physical activities that enable healthy physical development are required. Taylor also states that schools must have team-work areas, big horizontal study desks instead of personal ones, movable and rechangable furnitures, meeting points inside and outside and conference rooms for students with spatial intelligence; schools also must provide acoustic rooms where musical activities can be performed to realize musical/rhythmic intelligence (Taylor, 2009).

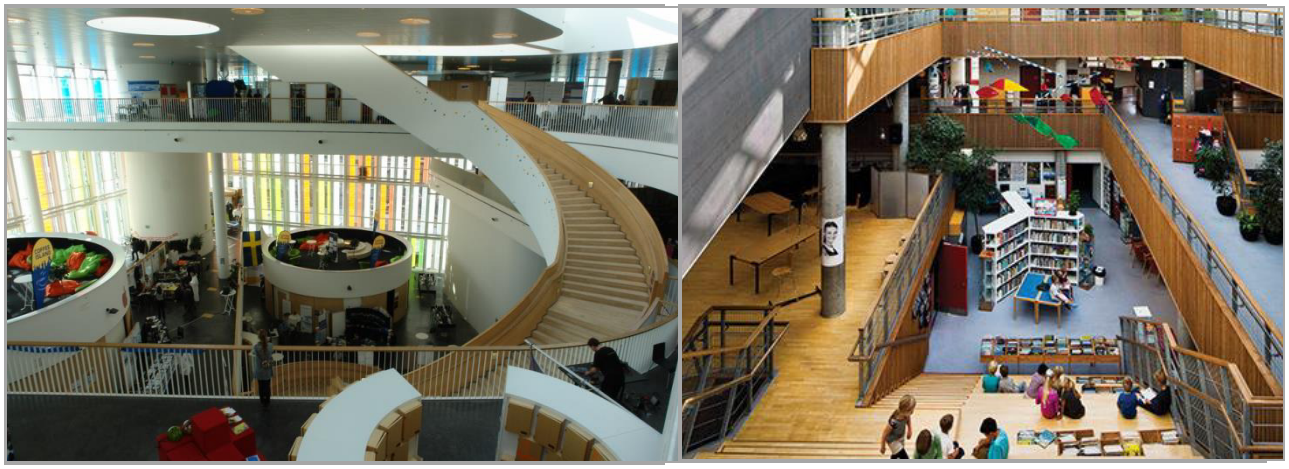
Innovative Approaches in Education Environments

As it was mentioned above, one of the important conditions to realize modern education approaches is to create physical environment which can respond to different needs during education process. In this chapter, the search for contemporary education environments in literature is studied. In that regard, spatial resolutions and mobile-movable proposals such as "open plan, learning studios, learning suit, small learning communities, advisory based planning" are analyzed.

- **Open Plan School Design**

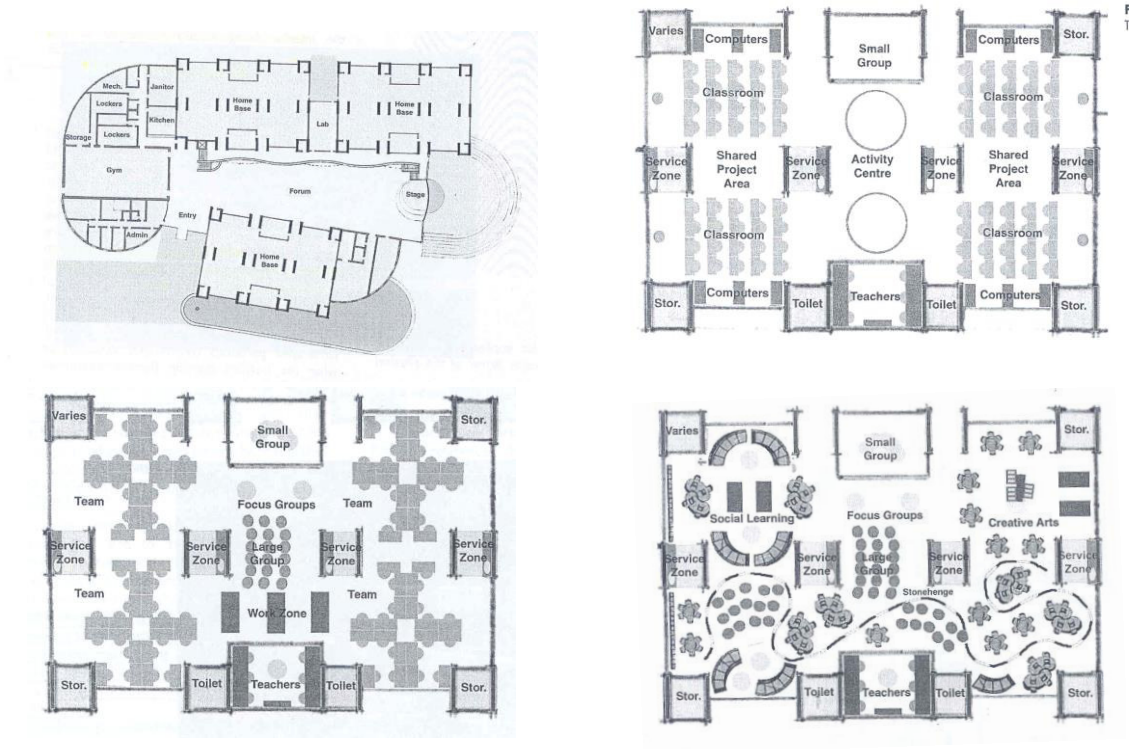
Open plan school design is one of the first examples of new searches against conventional education. The plan system rose from the criticisms against USA's traditional education understanding in middle of 1960's by American educators and the adoption of informal education understanding of England. Open education approach advocates more educational options for children, independency and autonomy for children by directing to do their own studies, less teacher guidance and more student self-responsibility. In that respect, open plan school understanding was determinant in

design of most schools from 1950's until the beginning of 1970's. Large, open and flexible spaces of those schools were appropriate for team works, small group studies and individual studies. However, such solutions also brought criticisms as well. Educators' biggest critics were the visual distraction and noise. Yet, the studies showed that there was another big mistake regarding the critics. It was seen that teachers were not educated with required learning skills and so conventional learning methods were still being used in that process. To say, the problem of open plan design actually was that open education was not comprehended enough by educators (Lackney, 2009b). In recent years, open plan spatial organizations are used for creating different types of education environments successfully. The samples are presented in pictures below (1, 2) that show the implementation of open plan system with flexible usage of education environment.



Picture 1: Ørestad College (left), open plan spatial organization (https://c1.staticflickr.com/7/6130/5948300714_7522bff05e_b.jpg, 2016)
Picture 2: Hellerup School (https://s-media-cache-ak0.pinimg.com/originals/94/13/97/9413974aa141e9f87d83e24532fcc398.jpg, 2016)

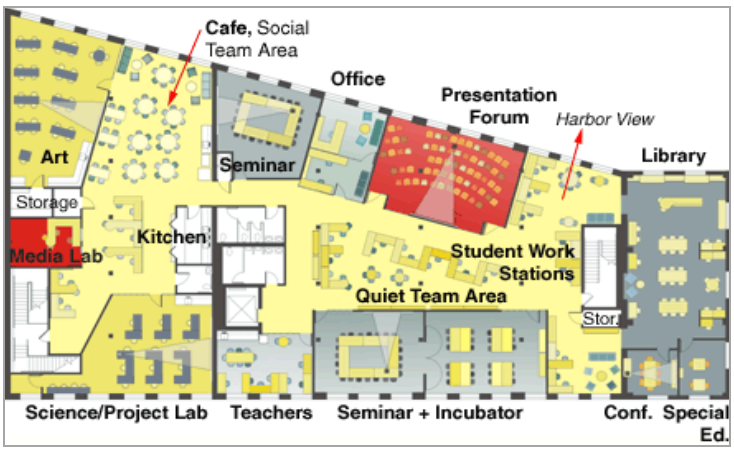
Proposals from various studies argue that it is necessary to have flexible solutions in education environments. According to Jilk (2005), the most significant subject in designing physical environment for education places is to have the option that teachers and students can create their own learning environment instead pre-defining everything for them. An environment design without contribution of students is not completed in that sense. Hence, as considering the option to have creative participation, he proposed a school order where all the main spaces are fictionalized as persistent but at the same time unfinished as an alternative approach **(Picture 3)**. In that design, he developed a school model that is adaptable to four different learning options with flexible and served spaces design concept for stable service zones and multiple various utilization configurations (Jilk, 2005).



Picture 3: Flexible and participative school model proposal (Jilk, 2005)

- **Advisory Model Planning**

Advise based planning or advisory model is formed by combination of class concept and learning studio concept that enables different study options. Classrooms and group rooms of advisory model are designed as learning places for one group of children. An advisory model school design is presented in picture below **(Picture 4)** that was formed with classrooms, group rooms and learning suits (Prakash and Fielding, 2007).



Picture 4: Advisory based planning
(http://www.designshare.com/Research/Nair/Plan_txt_440px.gif, 2016)

- **Small Learning Communities**

In 1990's, the tendency to build new small schools and reorganize large schools as "school within school" was started to seen regarding the need of new education environments. The drives of the tendency were that small schools participate more in school events during education studies than large schools, organize different activities from program in addition, students are more satisfied, have more social commitment and work with society; moreover, such schools confront less disciplinary problems like vandalism and drug use than large schools. Large scale structures are designed as social network groups where 100 -120 students can be educated and those groups are defined as "learning communities". It is seen in various school designs that architects promote individualism in their structures. Places that are designed flexible and changeable, as individual study areas helping to develop feeling of ownage and responsibility, enabling to learn alone are used in that respect; moreover, areas where teachers can prepare team work and collaboration materials and held meetings are designed. Those schools have functional spaces proper to learn in collaboration; also presentation areas, galleries, areas for using technology, various socialization areas that support creative thinking and problem solving are formed in designing these schools. It is important that these schools can benefit from other opportunities in learning process by getting in contact with functions of the environment (Lackney, 2009b).

Most of large schools try to create small learning communities (SLC) in order to have smaller communities in large school campuses. Also, other than implementations of large school campuses, small learning community (SCL) model helps to create small learning communities within itself via using learning studios together with some mutual spaces of schools. Such implementations are based on learning studios. An example of that approach is "Djidi Djidi Aboriginal School" **(Picture 5).** Small Learning Community (SCL) has a simple organization form constituted by learning studios connected with small group rooms, cafe and project areas. The main idea behind the approach is to make small grouping so that every person shall know each other (Prakash and Fielding, 2007).

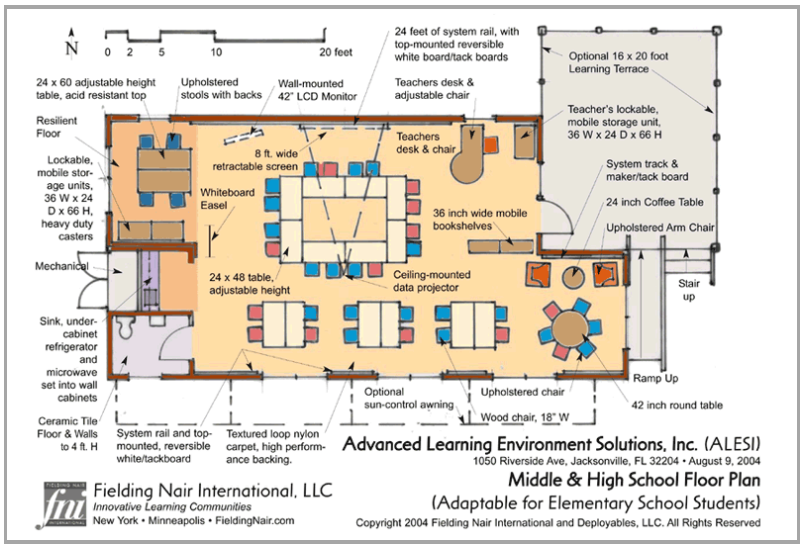
Picture 5: Small learning community (SLC) in "Djidi Djidi Aboriginal School" (http://www.designshare.com/index.php/projects/djidi-djidi/images@3056, 2015; http://www.designshare.com/index.php/projects/djidi-djidi/images@3057, 2015; http://www.designshare.com/index.php/projects/djidi-djidi/images@3061, 2015)

- **Learning Studio**

Generally, learning studio definition is used to describe L-shaped classrooms. One of the first learning studio examples based on the idea was L-shaped classrooms of Crow Island School designed in 1940, Illinois. Redesigning the classrooms as learning studio was the very first implementation of that approach (**Picture 6, 7**).

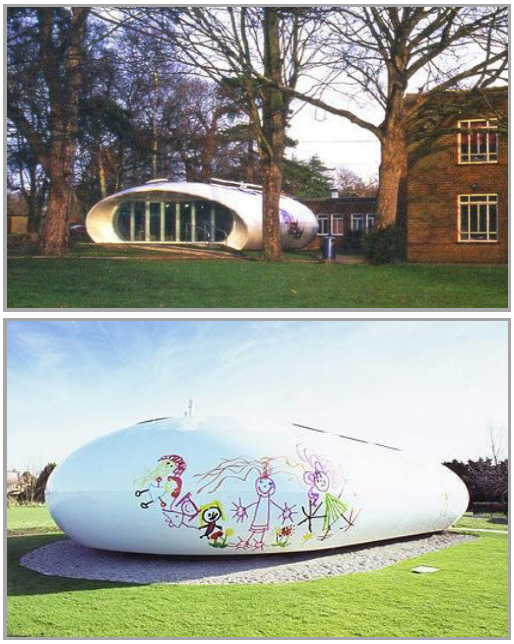
Picture 6: Crow Island School (left), classroom (Lackney, 2009b), **Picture 7**: Crow Island School, classroom interior (http://peterbrown.typepad.com/.a/6a00e55113a79188330134897cf2b9970c-pi, 2016)

The basic idea behind learning studio is creating a space that responds to different learning types with different regions and flexible learning zones. Classrooms defined as learning studio are superior to conventional classrooms regarding multiple intelligence (Prakash and Fielding, 2007; Lackney, 2009a). A learning studio example that responds to different group studies is shown in picture (8) below. The studio is designed with service areas as toilet, kitchen niche, mechanic niche and a terrace for outer space activities.



Picture 8: An example of learning studio (http://www.designshare.com/images/name/lippman/lshape/10a_800px.gif, 2016)

Another example for learning studio is the independent classrooms project which is named "Classrooms of Future". The project was made in 27 new pilot schools in 2002, England, based on the themes "nature and technology". One of the classrooms was designed by a company called "Future Systems". The design was an independent classroom which was started to be used in 2005 and named "Mobile Classroom". The shape of the classroom was curvilinear shell and its structure was made by balsa tree with fiberglass top cover. The studio has also its private toilet and an independent heating system like the other example (Chiles, 2005; Kronenburg, 2007). The purpose of this project is to make children feel comfortable and enable to learn on their own ways. Two separate schools used such implementation. A broad terrace was designed in front of the classrooms and inner space was structured for 30 students on 100m2 area. That dimension is quite more than the area for a student within classrooms in general. Another purpose of shell structure is to create different exhibition surface to students with its top surface **(Picture 9**). It is considered that creating a place where students can exhibit their art works shall contribute children to feel ownage against their new environment (Mostaedi, 2006).



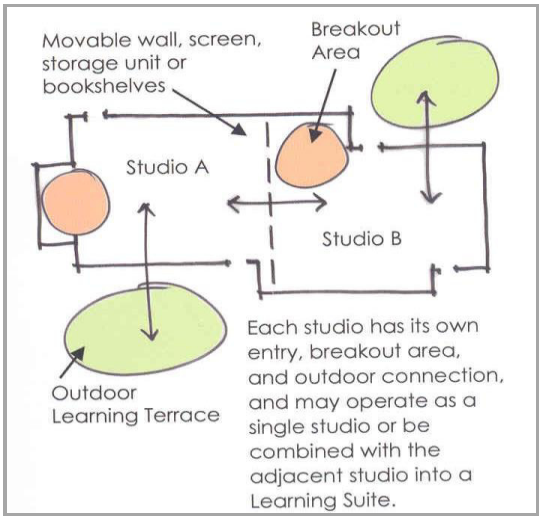
Picture 9: An example of Classrooms of Future project (https://undiaunaarquitecta.files.wordpress.com/2014/09/future-systems.jpg?w=580, 2016; http://i.telegraph.co.uk/multimedia/archive/01192/arts-graphics-slid_1192883a.jpg, 2016; http://3.bp.blogspot.com/_wicciHNvHag/SOq453LfksI/AAAAAAAAAX8/3PDkiGLEmZU/s400/mobile+class+2.jpg, 2016).

The other example for learning studio as an independent education area is named "Cutting-edge Cardboard" which is designed by Cottrell & Vermeulen Architecture in 2000, Essex, England. The total space is built on around 90m2 and is designed as a classroom of the school; also, it was aimed to create flexible usage area. Paper tubes were used in the structure and composite panel system "cardboard" was used for cladding (**Picture 10**). The reason for using paper as a construction material was to raise awareness of sustainability to children. The intends of the project were both to inform children about sustainability and to develop feeling of ownage and proud by making them to collect construction materials and participate in building process. It is stated that the project reached its desired objectives at the end (Richardson, 2008).

Picture 10: Learning studio named "Cutting-edge cardboard" (Richardson, 2008)

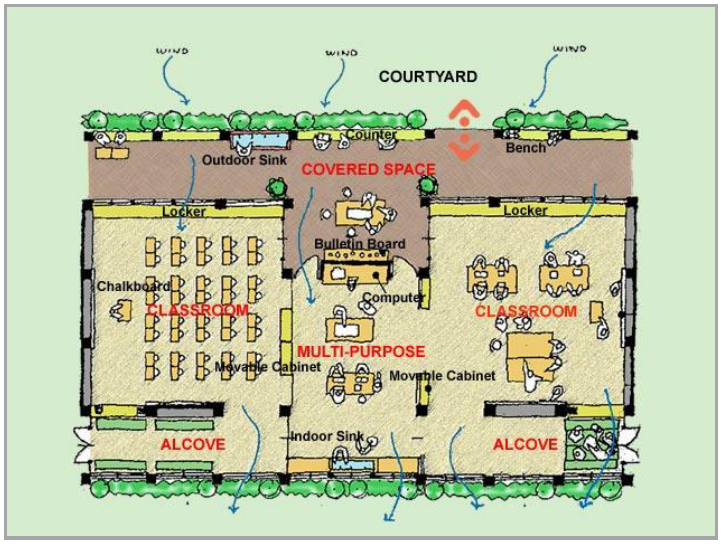
- **Learning Suit**

An education environment constituted by two learning studios is defined as "learning suit". Two learning studios are designed as one learning suit. It is sated that when learning studios are reunited as a learning studio, learning and teaching options shall be expanded. That model provides possibility to teach as a team and also to study outside of the studio as required which is seen as positive in terms of having possible options (Lackney, 2009a; Prakash and Fielding, 2007). In graphical expression shown below, there is a learning suit reunited by two learning studios. Separators like mobile walls, screen, and closet are used in between two studios. A suit can be converted to one unit place and each studio has its own entrance and terrace (**Picture 11**).



Picture 11: Arranging the learning suit (Prakash and Fielding, 2007)

Separation between learning studios are realized by mobile walls and furnitures; so, examples for different preferences can be realized in that way. For instance, Tajimi Junior High School, Japan, is seen to prefer mobile furnitures in order to reunite and rearrange easily the classrooms everyday as required (**Picture 12**). Other example is mobile walls of East Side High School. It is stated that the separation created with mobile furnitures in Tajimi helps to experience the learning suit as a friendlier place. On the other hand, mobile walls as a separator are lead to feel more the separation created in between two studios. Since a model based on furnitures is more flexible, generally it should be preferred when teachers of two studios want to work in more close relation. Yet, acoustic separation is possible with movable walls and it does not cause a problem during different study times. Hence, children speak at their daily voice level used within the family. It is possible to have so many different learning activities since there are two divided space (Prakash and Fielding, 2007).



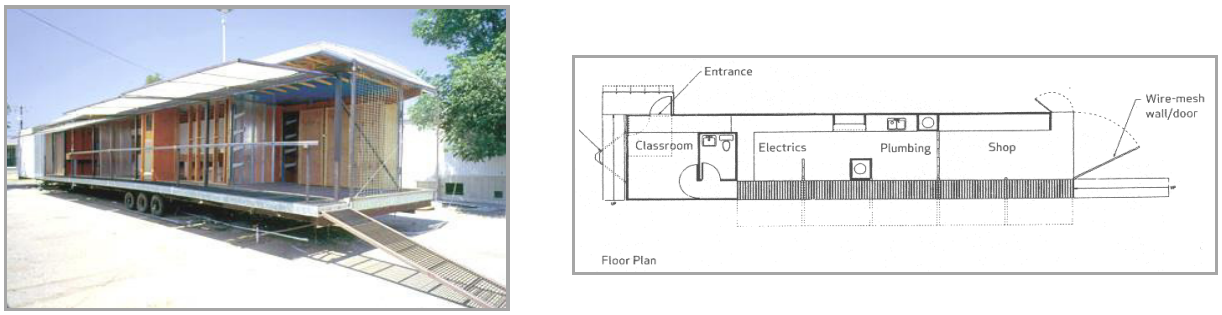
Picture 12. Furniture based learning suit model in "Tajimi Junior High School" (http://www.designshare.com/Awards/2004/submittal/project_image.asp?image=4&project=453, 2016)

- **Mobile and Movable Solutions**

Education environments are designed as mobile can be demonstrated as an example for implementation where singular and small scale structure of learning studio is addressed from different perspective. An ecological laboratory named "Eco-Lab" is the implementation in that scope (**Picture 13**). Eco-lab was designed by an architect Jennifer Siegal (OMD: Office of Mobile Design) in Los Angeles, California. It is a mobile classroom design built by recyclable materials and the importance of environment and sustainability are explained through multimedia programs in this lab (Kronenburg, 2003). The classroom visits different schools and attracts children attention a lot. That attention is also emphasized by Siegal, the designer of the classroom; the mobile classroom becomes a place for interaction with children, discovery and entertainment right after it enters school yard, opens its entrance and is started to be used (Siegal, 2002).

Picture 13: Mobile ecology laboratory "Eco-Lab" (http://www.designmobile.com/ecolab.html, 2016)

Mobile solutions are preferred because they can serve the same options for different groups. An education center named "Portable Construction Training Center-PCTC" was designed in the line of the approach. The unit was designed specifically to serve lower income groups to have their own place to live (**Picture 14**). Mobile classroom works as a center where techniques of construction are explained. Based on the idea to be a model structure, all the materials used in the construction of it are recycling materials (Kronenburg, 2003).



Picture 14: Mobile education center (https://c2.staticflickr.com/4/3344/3333809477_85f352ea39.jpg, 2016; Kronenburg, 2007)

Another solution that was presented under the project Classrooms of Future is to prefer movable structurality for education space which also can be identified as a classroom or learning suit. A design named "Trailer Tricks" was planned by Gollifer Langston Architects in London (**Picture 15**). The classroom was designed as a movable product with 2.5m x 4.5m dimensions. Considering the dimensions of it and the general appearance, it is assimilated to a capsule. In addition, those features enable to expand the education area through opening its one direction (Richardson, 2009).

Picture 15: Movable classroom "Trailer Tricks" (http://cubeme.com/classroom-of-the-future-by-gollifer-langston-architects/, 2016; http://archinhome.com/architecture/classroom-of-the-future-mobile-classroom-by-gollifer-langston-architects/, 2016)

Evaluation

When literature is analyzed as the follower of modern education approach, physical environment also should be able to respond to the needs of education program; hence, it is seen that new researches are required in the field and lots of innovative design examples are realized in that regard. Flexibility is preliminary criteria in suggestions of new school design and implementations developed as independent units. Flexibility in open plan solutions, learning studios and suites are considered as creating spatial divisions in education environment that are convenient to different learning necessities, leaving the usage relations of divisions to the users' preference and having reshape potentials of space according to changing needs. In addition, mobile and movable solutions serve to the idea that flexibility criteria can be considered in a wider scope when such solutions can be used to shape education environment in needed time and so meet desired requirements. Sustainability is the second dimension that its importance is emphasized in the examples. It can be understood from the examples that it is important for education environment to be a model as a learning mean by its physical construction in order to raise awareness of sustainability on children in early ages.

When an evaluation is made specific to Turkey, these spatial approachs can be seen in two samples. Although the primary purpose is not to respond modern education approaches, those spatial solutions are made to increase number of children benefitting from preschool education opportunities. Mobile Preschool Project is an implementation that is created as a mobile education space where different groups can benefit from its opportunities and preferred due to its economic advantages (**Picture 16**). An ordinary bus was transformed into a classroom so that children of lower income families can benefit from preschool education opportunities. Mobile Preschool Project was first created in 2004 by the protocol among Ministry of National Education General Directorate of Preschool Education, Governorships, Mayorships and universities (İnanlı, 2007).

Picture 16: Mobile Preschool (www.ooegm.meb.gov.tr/13projeler_mobil_okul.asp, 2010)

Another spatial study that was suggested on the line of articulation to school structure is Prefabricate Preschool Project (**Picture 17**). Project was developed in 2011 when Ministry of National Education made decision that preschool education shall gradually become obligatory across Turkey. The purpose of the project was to give the chance to elementary schools which do not have the opportunity to create preschool within itself (Anonym, 2011).

Picture 17: Prefabricate Preschool Project (Anonym, 2011)

Both solutions have similarities based on using an articulated structure and preferring mobile solutions with other examples explained in chapter where innovative approaches in education environment were analyzed; however, there are completely different in terms of their contents. The presented examples are lack of designs criterias like the flexibility search, sustainability message of structure and suggestions to create feeling of ownage to children. In that respect, the aim of implementations should be to progress more in research studies. Another important subject for creating an environment appropriate to education program is participation. A designer has to know education process; thus, it is important to communicate with educators and students for get information.

A significant principle of modern education is the transformation of knowledge during designing an education environment. In that process, architect, educators and students should collaborate together in order to fulfill information gaps of architectural design (Dudek, 2002). Leaving the standard approach of school design that is in line with conventional education methods and having appropriate solutions for new requirements of modern education approaches, is possible only by the adaption of participation in all stages of school designs.

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