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The Impact of the Quality Designed Learning Environment on a Child's Behavior in Kindergarten Stage

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Abstract

The early years of childhood are of great importance because children's growth rate is high physically and intellectually. An ambience should be provided that allows children to use the best of their childhood. Most of public schools' kindergartens in Jordan were not actually meant to be a child care centre; this study has revealed that the quality of the physical and social environment affects child development in this education process, and that kindergartens have a major influence on child development since these are places where children spend most of their preschool time. In order to improve the conditions of the physical environment, designers can try to reach best design solutions, by getting children's ideas about their educational environment. Data for this study were collected in library method, first investigates previous studies on designing kindergartens and children's demands and their importance, and then investigates the IEQ of public kindergartens in Jordan "a kindergarten in As Salt -as a case study- ". The questions that the children were asked in this study aimed to learn children's evaluations and expectations about their settings. The most important result reached in the study was the observation of the ability of 5 year-old (between 48-60 months of age) and 6 year-old (between 60-72 months of age) group of children to construct successful verbal statements about their physical environment by referring to their own experience. In short, this study has demonstrated that kindergarten design can be approached under three main headings, namely organization of the environment, selection of materials, and detail solutions, based on pre-schoolers' experience.

Keywords: Kindergarten design • Indoor Environment Quality (IEQ) • Preschool education • Spatial zoning • Physical environment.

Introduction

Over the past few decades, a growing body of research has shown that early childhood education has a special importance among all other education processes, according to their influences on children and society. In recent years, preschool education has been growing interest and popularity. The increase in the rate of working women, the acknowledgement of the importance of preschool education for the future of societies, the desire of families for their children to make a better start at school and in life, and the observation of long-term positive effects of high-quality early childhood programs can be cited as reasons for the growing demand for preschool education [1].

Since early childhood development is viewed as a key to social developments their impact on child development shaped largely during the 0-6 age. According to this fact the physical environment in education buildings and experiences gained during preschool has a great impact on children's behavior.

Indoor environment quality (IEQ) plays an impact role in the comfort and efficiency of the occupants of indoor environment to achieve the physical and psychological: physical comfort refers to meeting the fundamental needs of occupants, such as adequate lighting and space allocation for each individual, psychological comfort involves the occupant's satisfaction of their colleagues and management and feeling of enjoyment.

This research focuses on the impact of indoor environment quality (IEQ) on a child behavior, how the spatial zoning in the room should support all the activities needed during school time to enhance children participation. And also show the importance to the health of students and teacher resulting from poor IEQ could influence students' performance, behavior and productivity.

Objective of the study

The objective of the study is to identify and reflect the relationship between the physical arrangement of kindergarten in public schools and the behavior of children. Since the standards of kindergarten's responsibility are to make sure that the environment supports the activities and needs of the children who use the space times.

The study came up of understanding children's idea of the space they use based on the psychological effect. To draw conclusion that met children's needs and improving the conditions in preschool environment.

Significance of the study

In Jordan context the coverage of kindergarten education has improved dramatically in parallel with the government's policy of making kindergartens programs compulsory. As Nicholson points out, children discover the world through their senses [2]. Thus, by nourishing senses and emotions, architecture plays an important role in child development [3].

The quality of the physical and social environment affects child development in this education process. So it is important to improve the conditions of the physical environment, and try to reach the best design solutions, by getting children's ideas about their educational environment. AsDudek indicates, a successful design for children's facilities is "a design that gives the child opportunities to discover, develop and learn" [4].

Research Methodology

The materials were collected in library method. This research first investigates previous studies on designing kindergartens and children's demands and their importance and then investigates the IEQ of public kindergartens in Jordan–AL salt, through survey questionnaires, informal interview with children and field observation. Then evaluate the result through comparison between the local case in Al-Salt, Jordan and international kindergarten -Beşevler neighborhood

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-in Bursa, Turkey. This approach was used to ensure that the data gathered from the questionnaire could be contextualized with the various physical environments that provide the kindergarten's facilities. The questions that the children were asked in the scope of the study have been formulated to learn children's evaluations and expectations about their physical environment and to understand their expectations from kindergarten settings. Observation of the building, identifying individual characteristics in order to identify the setting and context, physical configuration, and environment feature of kindergartens. And then introduces a framework in conclusion section.

The purpose of this study is to put together the components of the kindergarten and find functional ideas to be used as a guideline by architects in designing kindergartens.

Social value of preschool education

A preschool child is defined as being between the ages of four and five, a time when children start to work together and interact with other children. They develop their verbal skills rapidly as they become more interested in books and writing [5]. So that offering children a rich variety of stimulants, using both indoors and outdoors must be delivered in preschool education environments Especially AsDudek indicates, a successful design for children's facilities is "a design that gives the child opportunities to discover, develop and learn". In order to give children a better start in life. Though Preschool education is a process in which children leave the restricted home atmosphere to join a wider social network [4]. High-quality education contributes to a child's intellectual, social, physical and emotional development [6]. So we can say preschool education environments are spaces that are capable of offering children a rich variety of stimulants, using both indoors and outdoors (Figures 1-3).

Moreover, this is the period when personality, social sensitivity and creativity start to be shaped. It is known that the development process that takes place in this period greatly affects subsequent years and that 60-70% of learning ability is gained in the preschool period [7-10]. The process of preschool education influence children and society on short terms and long terms. Since early childhood development is viewed as a key to social development. So it has been found out that the physical environment in education buildings has a great impact on children's behavior. Interaction with the physical environment is as important for children's learning as people that surround them in their daily life [11].

The advantages gained by children in the process of preschool education are viewed as a key to community development, in short and long terms.

The short-term benefits of early childhood development include mental development (higher IQ, practical reasoning, oculo-manual coordination, readiness for reading, ...), health (lower risks of getting sick, less digestion disorders, less growth inhibition, better hygiene and healthcare, ...), and social development (better developed perception of personality, lower aggressiveness, more interactive playing, better relations with peers and parents, more social compatibility, ...).

The long-term effects of such gains on society, on the other hand, are described as "human development" and "economic growth". Therefore, early childhood development programs should be considered as a contribution to long-term economic development strategies. Shonkof claims that the foundations of a successful society are laid during early childhood development [12]. It is emphasized that children, who are given the opportunity to reach high quality education programs during early childhood years, will have a greater chance to become healthy and successful adults in society [13].

Discussion

The quality of preschool education is related to the quality of the architecturally planned and designed physical environment (Designed Environments for Young Children: Empirical Findings and Implications for Planning and Design 1 n.d.)

Impact of the environment

We look at the effects of different degrees of spatial definition of behavior

Figure 1. Most popular place for playing-Turkey.

Figure 2. Most popular place for playing in salt.

Figure 3. Most popular place for playing inside the classroom (1) Turkey (2) Al-Salt.

sitting on these social and cognitive development outcome variables. The environment is a good indicator of how children should respond or act. Room arrangement and materials determine where children focus their attention.

Children learn through exploration and investigation of their surroundings. A learning environment should be attractive, exciting, and a place where a child can learn and play using suitable resources [5]. Most of the characteristics in the physical setting can have an effect on the way the occupants behave and on their mental health. This includes the interaction with the environment, which aids children in their development [14]. How children interact with their environment and its occupants should influence the arrangement of objects and activities in the space [5].

Spatial zoning

Spatial zoning relating to the physical space occupied by an individual and the way it is divided to form different areas. Moore describes a well-defined

behavior setting as an area that enables one activity while successfully combining elements such as boundaries, circulation, and visual separation [15]. Kemple explains that children will better understand the activities they are expected to do based on the type of social interaction. In most of the studies, spatial arrangements of the room are described as an open/closed plan or as modified open plan [16].

Open/Closed

An open plan refers to a space with an open area. Open plans have been used because they are believed to provide a structure-free and changeable environment [17]. An open plan child-care center includes an un-partitioned space with few or no walls. In contrast, a closed plan consists of self-contained classrooms along a hallway or a group of interconnected rooms [15]. There are varying opinions on the value of an open plan. Kostelnik, Phipps Whiren, Soderman, Stein, & Gregory [18] believe an open plan encourages interest, investigation and social communication while Moore [15] states that open plans create distractions for children, which cause them to spend less time on activities that enhance their education. The open plan also increases more traffic and provides a greater opportunity for accidents due to running and rough play [15]. In addition, an open classroom that does not have many boundaries can lead to aggression and elevated activity [19]. Another argument researchers make is that open plans can create more noise, aggressive behavior, and distraction from school-oriented activities. Their research showed that an open plan with no boundaries leads to a larger number of significant negative effects on children [15].

Modified open plan facilities

Moore's research led him to recommend a modified open plan that has an advantage over open/closed plan [15]. It removes the disadvantage of dividing activities into small or large spaces and provides an open room in which children can interact visually with the space. This in return, provides them with a separation from noise and visual distractions.

Density

Density, the number of children per square feet of classroom, was a key factor when selecting the classroom to observe for this study. However, there should be no more than 16 children per classroom. Moore describes two types of density. One deals with the square footage per room and size of the classroom, the other deals with the number of children in one room. Density in a classroom can have both a positive and a negative connotation [15].

The positive connotation is directed towards keeping a low density in preschool classrooms. Batchford, Kutnick, and Martin [20] state that smaller classes are beneficial for children at a younger age and Maxwell [21] states that keeping the class small can lead to fewer behavior problems and more participation from students. Maxwell also states that in smaller classes, children show more academic improvement. In addition, in smaller classrooms, teachers are better able to provide children with individual help [21,22] noted that children in small density classrooms performed better academically than their peers in high-density classrooms. She stated a low-density classroom should have, at most, 15 students. There is not a significant difference in improved performance by children in classrooms exceeding this number of students. Kemple [16] explains how a ratio of 10 children per one adult is adequate to maintain the low density. In addition, children should be in groups of no more than two to four children when they work together.

Conversely, high density may lead to aggression, conflict between children, lack of concentration in activities, decreased social contact and increased isolation [15]. Crowding has negative effects on young children [14] and a lack of sufficient space can lead children to be solitary and to lack interaction [21]. When the size of the group increases to more than 16 children or the square feet per child from 25 to 15 has significant effects on children such as aggressive behavior and fewer group relationships [21]. The preferred room size is between 1000 and 1200 square feet for approximately 14 to 16 children [23]. High-density spaces and crowding have a greater effect on boys than girls and, as density increases, so does the behavioral problems of boys [21]. The feeling of crowdedness may be alleviated by providing a private space for the children [14].

Activity areas

Activity areas are spaces where children can learn by hands-on experiences and a well-organized activity area will help regulate behavior problems [23]. Children should work at tables rather than desks and these tables should be divided according the each activity [24]. Depending on the room size and arrangement, a room can have up to 15 to 20 activity areas. These activity areas should have five defining characteristics [25].

1. They should be in a location that is adequate for each activity.
2. There should be visible boundaries.
3. Each activity should have adequate sitting and working surface.
4. Each area should have sufficient display and storage space.
5. Each area should be well defined visually from adjacent activities.

Private spaces

Within the spatial zoning of the classroom, there has to be an area where a child can put all social activities on hold and spatial arrangement. The design of the space can affect a child's self-esteem, security and comfort within that specific space [17], and the environment can be arranged to encourage proper behavior by adequately zoning areas and materials in the space [26]. Some of the advantages of a well-designed environment according to Kemple [16] are the decrease of aggression and the increase attends to private moments. These areas should be large enough to fit up to two children; this area should also have a view of the whole classroom as well as being a cozy space to get away [18]. These areas are not to be used as a time-out place or to be used as a punishment area but to give the child a place to relax, be comfortable, and have privacy from the rest of the children.

Classroom size become less than the minimum requirement of 25 ft square per child, the space becomes too small for interaction and therefore inappropriate for development [16].

Playing and learning in outdoor space (Garden)

According to psychologists, childhood is the time for playing. At the beginning, the child plays with objects and then the people. Since the age of 3, the child gradually participates in social and group games. Playing is a part of children's nature that happens automatically and involuntarily, and improves them physically and mentally [27]. They play intuitively only because playing is pleasant and enjoyable. Playing games recognizes and develops child`s talents and creative potentials and increases linguistic, mental, social, emotional, and motor skills [28].

Designing kindergarten areas

The architecture of kindergarten can be in such way that has significant influence on the mind and spirit of children. Studying children's abilities and growth is a broad field. Taking children needs into account, architectural style can contribute to the child's growth (Table 1).

Keeping in mind that Child's safety is the first priority in designing kindergarten areas and then the flexibility of the environment to give the child a chance to play new games and daydream.

In general, this architecture should observe three main rules including the ability to play freely (variety of options), direct contact with nature, and expanding children's imaginations and fantasies. Designing begins from the kindergarten admission and continues to learning rooms. The plan can be divided into three basic parts of main entrance, open playground (garden), and interior design [27].

Entrance

The entrance of a kindergarten should look inviting for children and it is better to be designed outside the wall surface, because it signals the children that they are approaching to the kindergarten and excite them.

Table 1. The relationship between child's growth needs and activities appropriate to his growth.

Growth needs of 3-7 year-old children	Activities appropriate to the child's development
I. High curiosity	I. Painting
II. Imagination	II. Visual arts
III. Playing games	III. Play, puppetry, and
IV. Language development	IV. storytelling
V. Acquiring different skills	V. Music
VI. Making friends	VI. Sand playing
VII. Improving creativity	VII. Lonely and cozy
VIII. Loving musical and rhythmic	VIII. atmosphere
IX. stories	IX. Playing with water
X. Loving pencil and paper	X. Book reading
	XI. Outdoor activities

Table 2. Outcomes and suggestions related with environmental organization.

	Beşevler neighborhood Turkey	Public kindergarten AL Salt	Suggestions for the Design Process
1- Minimum area requirement	•Children in the small class *want to play mostly outside •Children in the larger class *are mostly content in *being in the classroom	* - Children want to play mostly outside	*The minimum 1.5 m^2 Standard is not enough. * 3 m^2 area per child is Sufficient.
2-Arrangement of usage spaces in the classroom	* Criticizing empty spaces in the large classroom with the fear of falling and hitting. * The most popular location in the large classroom being the playground with defined borders. * Being unable to define the most popular area in a small classroom.	* Being unable to define the most popular area in a small classroom. * -The class room divided in malti activity areas that can occupied small group (4-5 children) * -There is no sufficient area * For free playing.	* Designing the classroom without undefined empty spaces and using them as places that can be transformed for various activities. * Classroom design enabling preparation of activity Corners.
3-Impact of natural light	* Concerns related with changing room, that does not receive light * Negative impression of TV-computer room, which is dark most of the time	* -classes located in ground floor level, without receiving enough natural light.	o Designing education environment so that it will receive natural light in all areas.
4-Stairs	* Concerns for children falling when it is crowded	* Stairs being shared with older student, without considering safety factor.	* Usage of ramps instead of storied solutions
5-Outdoor usage	* Differences in the preference of play types for boys and girls * Need for free movement and natural environment * Concerns related with falling and injuries	* Need for natural environment. * - Concerns related with falling and injuries	* Creation of additional parts in the garden in accordance with different preferences: free and secure grass fields, toys that are not completely for sandpits, vegetable growth, animal feeding, areas for various flowers
6- Density	* 280 student	* 50 student , 25 per class	* Provide sufficient area for each children
7- Privet spaces	* There is no private, cozy spaces	* - There is no private , cozy spaces	* Provide large private space that fit up to two children
8-Activity areas	* * -No visible boundaries * - Enough storage spaces not adequate for each activity	* * -No visible boundaries * No enough storage spaces not adequate for each activity	* Provide enough storage spaces not adequate for each activity
9- Spatial zoning	*Open modified plan	* -Open plan of dividing activities into small or large spaces	* Dividing activities into small or large spaces and provides an open room in which children can interact visually with the space

Outdoor playground (garden and open natural area)

The vegetation increases the quality of air and in combination with alcoves, plays a protective role against the wind or rain and reduces the sound pollution. Changeable height of landform could provide children with a rich environment to play. It develops children's imagination and is a way to encourage innovations and practice their ability [29]. One of the parts of an open playground is a place where they can play with water and sand.

Interior design of a kindergarten

The locations of facilities and places such as toilets, taps, flash tanks, dining room tables, etc. should be designed appropriate to children's age and body. The followings should be considered in interior designing:

1. It is better to divide the internal spaces by short shelves, so children can see what is happening around.

2. The bookshelves should be appropriate to the height of children (almost 60 cm).
3. Sliding doors are better options for closets.
4. The space should fit the number of children. A small and busy space suppresses their enthusiasm and creativity.
5. Geometric shapes can be used in the walls and windows both for fun and educational purposes.
6. The appropriate light of classes includes natural light and shadow along with lighting.
7. Plugs and switches should be out of the reach of children.
8. A special place should be considered to keep children's food and nourishment.
9. The class should be a place to store playing tools, so that the children can take them easily and put them away at the end of the day.

By designing a suitable environment and using necessary equipment, children can enjoy painting, movies, theatre, music, visual arts, storytelling, and reading. In addition, some specific spaces should be designed, like a place to be alone for a while.

Developing the physical environment based on children's ideas

A number of studies [30-34] claim that "participation in design" processes need to be activated in order to ensure this. Participation initiatives are important experiences that support child development. For instance, in the context of the public schools, children's experience of participating in design is viewed as a process supporting their skills. In this study, the skills that children gain from participation have been defined in three levels, namely individual, cognitive and working skills. "Individual skills" have been defined as individual awareness, openness to new ideas, organization, motivation and responsibility; "cognitive skills" have been defined as creativity, problem solving, practical thinking, spatial awareness, aesthetic judgment, observation and evaluation; "working skills" have been defined as cooperation, collectivism, organization, citizenship, communication; and the most important skill gained has been defined as self-confidence. While it was expressed that the students were not expected to gain similar skills equally, the important issue was to get in contact with all children. Among children, this process has been described as a "life changing experience" [34].

Case study listening to preschool children

Learning the positive and negative views of preschool children about the environment in which they live will provide designers with data useful in the development of their design concepts. In this context, the study focuses on how children evaluate physical conditions in their kindergartens as well as their expectations. Through questions that the children were asked in the scope of the study have been formulated to learn children's views about their physical environment and to understand their expectations from kindergarten settings. The questions were organized to learn the positive and negative aspects of outdoor and indoor spaces for children, with the aim of identifying spatial experience and design solution relationship. While the necessity of using different techniques for understanding children's views and creating various communication channels (utilization of visual tools like as photographs, children's drawings, mapping etc.) by which children would be able to express themselves, is acknowledged in design participation efforts, then compare the results with other Children's comments on the physical conditions of their school in Bursa, turkey.

Al-Salt kindergarten

Al- Salt School is public kindergarten, located in Al Salt. The facility receives a total of 50 students, 25 whom are in the age group of 6 (60-72 months of age children), and 25 are in the age group of 5 (48-60 months of age children), two classrooms in the ground floor, this classrooms are approximately 56 m^2, and are used by 25 students/each class.

Typical activities in the preschool classroom include art, reading, math, science, dramatization, computer, block and multiuse stations [35]. Additionally, each classroom can be divided into zones such as the quiet zone, messy zone, and active zone. The quiet zone typically includes spaces such as reading, listening, manipulatives, writing, small blocks and math. The messy zone has water, sand, clay, painting, collage, science and a nature area. The active zone has large blocks, dramatic play, music and gross-motor skill activities [25]. Each area has specific guidelines to follow and an ideal location within a floor plan.

Turkey kindergarten

Located in Beşevler neighborhood in Bursa. The facility receives a total of 280 students, 180 of whom are in the age group of 6 (60-72 months of aged children), and 100 are in the age group of 5 (48-60 months of age children).

The building consists of 3 stories: ground floor, first floor and a cellar. The ground floor accommodates administrative units and a dining hall, while classrooms are located on the first floor. The cellar has a shared playing space, a drawing classroom, a computer room and a general purpose hall with sports equipment. Large classrooms are approximately 60 m^2, and are used by 20 students. Other classrooms have an area of around 30 m^2 and receive the same number of students.

Density

That space requirement is the least variable parameter in comparative studies made on kindergartens in different countries and contexts. In UK, for instance, a requirement of at least 2.3 m^2 for indoor space applies, whereas the minimum space per child in Italy for the age group of 3-6 is required to be 7.5 m^2 [31], in Turkey the average being 39 m^2 per 18 children, i.e., 2.2 m^2 per child [36].

It is noted that space less than 2.32 m^2 per child would cause negative impacts. The minimum space requirements in the US according to the Head Start Performance Standards and NAEYC accreditation criteria is 3.25 m^2 [37]. In their studies, Smith and Connoly [38] and Gifford [39] claim that 2.8 m^2 to 3.7 m^2 of space should be provided per child [40]. Space requirements in Jordan different comparing with other countries, as 1.5 m^2 of classroom space per child, in Al-Salt case study the classroom Area is 56 m^2 per 25 children, 2.24 m^2 per child, but this area is not sufficient due to the system of activity areas that have been used in each class.

Most popular place at school for playing

Playing is defined as a child's most important activity in preschool period. It stimulates the child's imagination and promotes the development of intelligence, muscles, imagination and social skills, guiding children towards understanding life. When playing, children step out of the context of everyday behavior, which serves as a basis for their development [41].

These evaluations have been verified by our case study at their favourite place at school for playing. The results indicate that girls preferred more static games such as "the family game corner" and tended to choose the classroom for this reason, while boys chose surroundings where they could be more active and dynamic due to their playing preferences.

Most popular location for playing inside the classroom

In both cases most of the girls indicated the family game corner, and most of the boys tended to prefer the family game corner. Responses from students almost evenly among different options such as "tables, everywhere, beside the toy rack and seating corner with chairs".

All the classes in this kindergarten allow having corners where children can play. Playing corners of this kind have been identified by most of the children as their favorite place for playing inside the classroom.

Least popular place for playing

In both cases some of respondents answered by saying "there is no such place", while other variations of responses referred to anywhere outside the classroom, the rest referred to the seating corner and floor (cold locations).

The reason why this area did not enjoy popularity was stated as “everyone is running and can therefore crash and fall down”. Another response to the least favorite area question was the hairdressing game corner. The reason provided was “nobody plays there and it’s very boring” [42]. Outcomes and suggestions related with environmental organization are given below in Table 2.

Conclusion and Recommendations

From past studies, we know much about the impact of the planning and designed physical environment of kindergarten on cognitive and social outcome behavior. In the process of improving conditions in preschool environments, where the fundamentals of the future are laid, real satisfaction of children’s needs is possible by understanding children’s ideas on the space they use.

Preserving the necessary quality of the physical conditions and satisfying the needs of both children and educators in kindergartens in order to ensure that children gain the experience they need in the period between age 0 and 6, which is described as a critical period for development, more effort should be made to incorporate the views of children and educators into projects. In addition to the great number of studies dealing with the social aspects of a child’s surroundings, more studies should be conducted aiming to understand the effects of a child’s physical environment.

This study has demonstrated that kindergarten design can be approached under three main headings, namely organization of the environment, selection of materials, and detail solutions, based on preschoolers' experience.

1) Making sure all paths are clear of obstructions to facilitate passage.

2) The room and the activities to be performed have to be analyzed to achieve proper placement.

3) All boundaries should be well marked between the different areas.

4) All materials should be visible to the children so they can explain four elements that, if manipulated correctly, can optimize the spatial organization of a room. The four elements are-

- Organization,
- Complexity,
- Variety, and
- Activities.

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