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## ASSESSMENT OF INTERIOR DESIGN REQUIREMENTS OF CLASSES WITHIN PRE-K EDUCATIONAL MODELS\*

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### **Abstract**

This study aims to analyze the interior design of a learning space based on three alternative teaching models applied nowadays. The study gathers the overall information of interior space design, alternative teaching models, children's needs and analyzes the interaction of the three selected teaching models with classroom design, besides it suggests what educational institutions can do at a general level to contribute to the improvement of early education.

The study is designed using descriptive research model, scientific observation and to collect factual data 72 teachers from Ankara (Turkey) were surveyed. Three different schools were analyzed by means of teaching model application within interior space design, a survey was administered in order to determine how classroom design supports the teaching-learning process and follows the principles of the teaching models. Research findings suggest that special attention should be given to classroom interior design since young children's behavior and social interactions with their peers and teachers are influenced by the spatial arrangement in classrooms. Likewise if the interior design of the classroom is based on teaching models' learning outcomes, the capacity and attitude of both teacher and student in the educational process are improved, while appropriate conditions are created for a pedagogical practice in the classroom.

**Keywords:** Pre-K Educational Models, Learning space, Educational Spaces, Interior Design.

### **Introduction**

Child care services operate including a variety of elements, whether using new buildings, constructed buildings, renewed spaces or built on purpose. These factors, along with children's ages, type of service, community, physical spaces, and so forth, involve challenges or opportunities for children (Stonehouse, A., 2011). Today, preschools have become an important part of a child's main learning experience as well as the space that affects children's behavior, however, adults are prone to forget that the spaces in which children live, grow, learn, and play leave a lasting impression. Children spend most of their

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time in built spaces yet they have no input into the design, aesthetic, function or organization of it (Dudek, 2005; Moore, 2002; Korpela et al., 2002). Children have been left aside, they are seen as invisible clients, who do not participate in the design process (Yalçın, M., 2017). With design, the opportunity to not only shape and improve physical space but the ability to positively impact the lives of the people who inhabit the space is given. Likewise, this gap between childhood and adulthood can be bridged to create nurturing spaces that are supportive of the activities that both young children and adults perform on a daily basis (Lynn West, T. 2011). Classrooms provide value to children's education, they form, help or interrupt their development and learning. Castro, M. & Morales, M. (2015) describe a learning space as a space constituted by physical, social, cultural, pedagogical, human, historical elements that are interrelated, supporting or limiting the interaction, communication, identity, sense of belonging and independence in children. This reality is directly connected with the type of education needed to give to the future generation, through spaces that cultivate the intelligence of the future and cultivate the autonomy of the student. Jaramillo (2007) reinforces this idea when considering the classroom as an essential factor in favoring the physical, social and cognitive development of children and that in turn can favor the development of skills required in the future. The purpose of this study is to assess the application of three educational models within interior space design requirements for an effective classroom design. The study analyzes the current educational models and the relation of these with the learning space and how by taking it into account the learning process is facilitated, the educational quality is achieved and the creation of spaces afford children's needs, among other aspects.

### **Theoretical Background**

Teachers have unlimited possibilities with regard to the educational models they can employ, but still traditional teaching models are often used, which focus on the teacher and there is little or no student interaction in class, despite being a more direct model, its efficiency is reduced due to the low attention and interest of some students, which impairs learning.

Despite the success of traditional teaching models in the past, current generations have a completely different mindset than previous generations, which requires new innovative models that work especially for today's students. Some of the educational models have existed for decades; there are some of them still employed nowadays, among which we can mention Waldorf Education, Montessori Model, Reggio Emilia and Harkness Model. Along with these, new models have emerged over time focusing on student-centered learning, where the student not only chooses to study but also how and where, according to his needs and interests. Education is changing from a traditional perspective towards a student-centered teaching, many of the models applied today have taken as base some of the aforementioned models, among these new models we can mention Phenomenon Based Learning, Project Based Learning model (PBL), STEM Education, Multiple Intelligences Theory (MI Theory) and Hands On Learning. For the purpose of fulfilling the aim of the study three models have been selected among the previous ones, being these STEM Education, Multiple Intelligence Theory and Montessori Model, this because these are the models most areas cover, are flexible in their contents and also are the most applied currently, giving utmost importance to the development of skills needed for a successful professional in the 21st century.

Education is given in spaces dedicated to provide the right conditions for an effective teaching-learning process, but also it should transmit certain emotions, as it is a significant space for children development. Supporting this conception Regio Children and the Domus Academy Research Center (2009, p.24), stated that the space must allow experiencing pleasure to be used, be explored, empathic and capable of capturing and giving meaning to the experiences of people who inhabit it; in addition, communication becomes a structure that is placed before the architecture at aesthetic and language level (Castro, M. & Morales, M., 2015). Therefore it could be said that the purpose of creating a learning space is to encourage children to be protagonists of their own learning providing them with a stimulating, creative and participative space where they can act, but also reflect on their actions from an active position that enables communication and the encounter with people who inhabit the space. According to Duarte (2003) the space should give children the opportunity to learn new skills, face new challenges, discover, create and think. At present, this concept goes beyond and a learning space is understood as a space of construction, exchange, stimulating and reflective for students and teachers (Riera, M., Ferrer, M. & Ribas. C., 2014).

### **1. Principles of Pre-K education Models and Interior Space design**

As the education keeps on evolving, it is necessary to know what it is an educational model, being that one that differs from the conventional educational system and in many schools is the basis of the educational system. Educational models are centered on providing students with the tools that allow them to become self-taught, but always under the direction of specialized teachers (Salabert, E. 2017). Its aim is to



provide an answer to series of doubts, concerns or perceived shortcomings of traditional education models that are of concern to education experts, parents and society in general. Educational Models in education have a complex nature, including a wide variety of research, approaches, techniques and tools that try to guarantee the learning process in children (Torrás Virgili, M.E., 2015).

Before discussing what a learning space is, we need to understand the definition of learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb 1984, p. 41). It is also the central activity of education entities. This may take place in classrooms or it can be the result from unexpected interactions among individuals, therefore referring to the term "learning space", the first thing that comes to our mind is a place, a space such as a school, a classroom, a library, etc. Indeed today most of the learning process is carried out in places like these (Oblinger 2006).

One of the cornerstones for the early years of child development is the creation of a learning space that supports children's learning, socialization, interests and needs. It should be understood that a learning space allows the practice of the teaching-learning process and its interaction with the educational model, being one of the factors that contributes to the development of an optimal learning (Oblinger 2006), it also produces the right conditions to improve students' learning, whether mental, physical or cognitively (Blackmore, J., Bateman, D., O'Mara, J. & Loughlin, J., 2011). The space integrates professional learning communities, allowing teachers to collaborate and share their knowledge to improve the skills required in the classroom and it also provides flexible interior space design and elements adapted to needs and teaching models, which help to improve performances and skills of educators in classroom practice (Partnership for the 21st Century Learning, 2017). Within classrooms, social interaction, unexpected meetings, and spontaneous talks take place contributing to personal and professional growth of the students (Lomas C. & Oblinger, D. 2006). The space is visualized as a space that possesses an invaluable wealth, following an educational strategy and constituting an instrument that supports the learning process. Space is considered as a living space, changing and dynamic, that adapts to children's interests, needs, ages and the space in which they are immersed (Instituto Colombiano de Bienestar Familiar, Ministerio de Cultura de Colombia y Fundación Carvajal, 2014). Likewise learning spaces function as transition spaces where the user experiences a change from his/her life world, a change in the way in which the world is heard, seen and perceived. Therefore, learning spaces can be seen as a requirement for the individual to create a space that contributes to his learning (McGraw-Hill Education website, 2016).

It is worth mentioning within the literature review by the end of the 1990's Cano and Lledó (p.9: 1995) referred to the concept of an educational space not only as a physical or material space, but also put emphasis on the interactions that took place in it and the capacity to project ourselves into it, especially the ability of children to use and appropriate it. Equally at the end of the 1990's, Coll and Onrubia (1996) defined the learning space as a structured space in which various elements and relationships are articulated to achieve the objectives of education, is taken not only as a knowledge-building space but as a an integrated and dynamic scenario that is flexible to time and needs of students (Riera, M., Ferrer, M. & Ribas. C., 2014).

All the elements that compose a learning space are of fundamental importance for the application of the educational models that strengthen the learning of the students (Castro, M. & Morales, M., 2015) so likewise success or failure of students depends on it. Then Herrera (2006, p. 2) mentions that "a learning space is a physical and psychological space of regulated interactivity where people converge for educational purposes" is supported by the idea of having an educational space that promotes learning and, therefore, the integral development of children. One of the greatest examples of learning space is the classroom, which according to Riera (2005, p.34) "is conceived as a dynamic and changing space that transforms and matches the needs of its inhabitants" this built space is one factor in many impacting on student learning outcomes. For the purpose of fulfill research objectives the classroom as a learning space has been selected among the areas within a school since it is the space where children spend most of their school day, with the aim to provide more specific, detailed and enriching information regarding how the selected space could be considered as a learning space.

#### **Interaction of learning space with Pre-K educational model**

The nature of the physical space affects the development of children, life experiences, the implementation of teaching models and the acquisition of different disciplines (Duarte, 2003). The classroom is seen in an active way, it consists of an aesthetically structured space where the design focuses on creating a social space, which supports learning, contributes with educators, allows the student to explore and discover for himself according to his interests and through the practice of theory it shapes students by promoting interactions among them and spaces (Lippman, P., 2010).



Consecutively, the Pre-K educational models and their relation to the learning space lies in the correct implementation of these, generally depends on an space that can adapt to the requirements of the models and provide the facilities, materials and tools necessary for the correct application of these, without overlooking that the purpose of Pre-K educational models is to provide an interdisciplinary education to students. A physical space can interfere with the education process as well as the implementation of the educational models, since the design of the space determines how easy or difficult teachers can manipulate the tools and furniture and interact with the space in order to accomplish their tasks. Educational models are centered on providing students with the tools that allow them to become self-taught, but always under the direction of specialized teachers (Salabert, E. 2017) whose role is affected by the conditions of the space and the furniture and materials within it.

### 1.1. STEM Model and Space Design

The National Science Foundation developed the word STEM from 2001 to 2004 as an acronym which stands for science, technology, engineering and mathematics. STEM is a teaching model that builds knowledge and skills development required to identify problems, collect and analyze data, experience and solve problems, both in professional and daily life. STEM is an integrative approach to curriculum and instruction, a type of integrated education for all types of students that removes the boundaries between subjects by teaching them as one (Morrison & Bartlett, 2009); its importance lies in the fact that it is the basis for the development of the skills necessary for a successful career regardless of the profession students choose. This seeks to improve competitiveness in the technological development of the nation through preparation in these disciplines.

The application of STEM education uses within classroom offers the following benefits,

- Educates students in different disciplines (integrated curriculum).
- Offers flexibility to fit different lessons
- Provides technological tools satisfying children's needs
- Enables a creative environment and free play, offering freedom of choice in activities
- Promote students to be an active agent in learning process

While applying STEM education, the space and student interaction is characterized as following,

- Space encourage teamwork so students interact efficiently among them
- Creative and innovative self-teaching materials are provided, allowing children to choose them independently.
- It is attractive to students as space promotes curiosity and interest.

Likewise teacher's interaction with the space could be defined as following,

- Space allows teacher to guide and observe students from every area
- Technological tools, furniture and teaching materials are provided, meeting teachers' needs
- Space offers opportunities to strengthen the student-teacher interaction

As an important element of STEM education, materials and furniture are characterized by

- Concrete materials arranged according to STEM disciplines
- Promote self-education and self-correcting
- Materials are aesthetic and creative also technological tools are employed

The STEM classroom is characterized by

- Provide flexible multi-zone teaching spaces
- Supports use of technology into class development
- Promotes individual and group work
- Generates spaces to play and experience promoting collaborative learning

In conclusion when applying STEM education within the classroom students become autonomous over when, what, and how to learn. Learning turns active, both the educator and the student participate in the learning process. Students actively participate in the learning process motivating them to learn and develop their critical thinking, interpersonal skills and to acquire a better retention of acquired knowledge (Dr. Jean Page, 2016).

### 1.2. Multiple Intelligence Theory and Space Design

Dr. Howard Gardner established the Multiple Intelligence Theory in 1983; it states that every person possesses different types of intelligence, that is, the capacities that are universal in the human species.



Gardner suggests that all individuals have the eight intelligences which may change over time, but each individual develops some more than others according to their abilities and problem-solving skills (Heming A.L. 2008). MI recognizes the different skills and abilities of children and people in general, which allows schools to expand their curriculum and develop better assessments applicable to the diverse needs expressed by students. It has also provided better access to education and meet the needs and demands of the educational actors (McFarlane, D. A., 2011).

Howard Gardner (1993:10) points out that the ideal school of the future must be based on two theories: the first is that not everyone has the same interests and skills; and the second is that we do not all learn in the same way. Multiple Intelligences Theory give emphasis to the variety of ways that people use to demonstrate their abilities according to the development of each type of intelligence (Lupiañez, M. A., 2010). Therefore a school should provide classrooms with areas where children can work each of the intelligences and facilitate teachers to develop their roles as intermediates.

When Multiple Intelligence Theory is applied within classroom some benefits are offered,

- Students are educated in different intelligences
- Is flexible to adapt different lessons
- Facilitates a creative environment, freedom and free play
- Students become active agents in their learning process

The application of MI Theory illustrates space and student interaction as following,

- Space empowers students to interact more effectively with themselves useful for students to be able to comprehend in a visual and easy way the Multiple Intelligences and thus makes available to students different types of experiences.
- Space organization allows children to become self-sufficient
- Collaboration and communication within the classroom is encouraged
- Creative and innovative self-teaching materials
- School furniture dimensions match students' anthropometry
- Space fosters self-confidence.
- Space promotes curiosity and interest in the learning environment

Likewise teacher's interaction with the space could be described as following,

- Teachers can interact more effectively with students within the space
- Dimension of the space allows teacher to create areas to different subjects
- Collaboration and communication within the classroom is encouraged
- School furniture and teaching materials meet teachers' needs
- Space offers opportunities to strengthen the student-teacher relationship

As an important element of MI Theory, materials and furniture are characterized by

- Concrete materials (real life)
- Encourage self-learning and self-correction
- Integrates aesthetically and creatively contents of the subjects
- Arranged according to different disciplines
- Fosters involvement of students in learning process

Multiple Intelligence in the classroom is characterized by

- Offers a set of activity centers, that is, areas in the classroom where each of the intelligences can be developed
- Big and open spaces
- Contact with the exterior (windows, doors)
- Subdivided into thematic areas
- Promotes movement around the space
- Supports use of technology into class development
- Organized, aesthetic and clean
- Promotes children's independence in exploration and the learning process
- Creative environment
- Provides flexible spaces to carry out the projects



- Generates spaces to play and experience

The Multiple Intelligence Theory holds that children all learn and understand taught material in different ways, which will help teachers to recognize their strengths and weaknesses and to plan according to the diverse abilities in class. The Multiple Intelligences theory requires a restructured classroom organization so that it meets all students' needs. In order to carry out the survey that will contribute to achieving the objective of the study, aspects of the architectural space and its relationship with the application of MI Theory in the classroom have been taken into account, ie, does the classroom provide spaces for the students to be educated in different intelligences?, is it flexible to adapt different lessons? Does facilitate a creative environment, freedom and free play? Do students become active agents in their learning process?

### 1.3. Montessori Model and Space Design.

Maria Montessori created the Montessori Model in 1907, she based her model on the child's work and cooperation among them and adults, where child must be in continuous learning and personal development (Montessori, M., 2004). Montessori is the model that best sums up the ideals of the new pedagogy, and also the one that has a closer relationship with architectural space (Masias C.R, 2012). In this model, there is a need of changing the shape of the space, the idea of one way transmission lessons to a more interactive and dynamic learning. The knowledge is acquired as a result of interaction with the space and the manipulation of Montessori material within the lesson plan. The Montessori Model supports the natural development of children in a well-prepared space, providing children with opportunities and tools for their development (Morrison, G.S., 2007).

The application of Montessori Model within classroom offers the following benefits,

- Provides an integrated curriculum.
- Offers a prepared environment
- Closer relationship with architectural space
- Furniture corresponds to model principles
- Provides flexibility and freedom meeting children's needs
- Creative environment and free play
- Students become active agents in learning process

While applying Montessori Model, the space and student interaction is characterized as following,

- Space empowers students to interact more effectively with themselves
- Space arrangement allows children to choose materials independently
- Collaboration and communication within the classroom is encouraged
- Creative and innovative self-teaching materials
- School furniture dimensions match students' anthropometry
- Space promotes curiosity and interest in the learning environment

Likewise teacher's interaction with the space could be described as following,

- Teachers can interact more effectively with students within the space
- Space allows teacher to guide and observe students from every area
- School furniture and teaching materials are easy to handle
- Space provides opportunities to strengthen the student-teacher relationship

As an important element of Montessori Model, materials and furniture are characterized by

- Concrete materials (real life)
- Promote self-learning being aesthetic and creative
- According to children's size
- Integrates contents of the subjects
- Arranged according to different disciplines
- Fosters involvement of students in learning process

The prepared environment of the Montessori Model is characterized by

- Big and open spaces
- Contact with the exterior (windows, doors)
- Subdivided into thematic areas or learning zones



- Flexible to move around the space
- Promotes children's independence in exploration and the learning process
- Creative environment
- Generates spaces to play and experience

Montessori kept the idea for better learning children should be provided with a prepared space, that is to say a place where they can do things by themselves. In a prepared space, learning materials and experiences are available to children in an organized format (Morrison, G.S., 2007). The prepared space by Montessori seeks to provide a learning space where children can act spontaneously, an space free of physical barriers, that is, rows of desks and chairs, so that children have the freedom to express by themselves, move within it and can create their own work groups based on individual interests (Montessori, 1972: 46).

### **Assessment of Pre-K education Models and Interior Space design**

For the purpose of analyzing the implementation of the three educational models within the interior space design, five items have been developed based on the aforementioned information in order to assess how each method and the physical space interacts and provides the right conditions to contribute children's development. These items used in survey were taken from common aspects found through a comparison between the methods.

#### **Learning outcome 1**

"Evaluate the application of educational model in the learning environment". It emphasizes the physical space as a tool for the application of teaching method and learning process, as well as its importance in the flexibility of learning within the space. The three methods are applied in dynamic spaces, which will indicate the success or failure of the application of the method in the classroom.

#### **Learning outcome 2**

"Evaluate the space implementation in terms of the role of student as an active agent". It refers to the development of children as active agents of the learning process by assuming their role effectively, while the physical space provides them with the right tools to and empowers them to interact more effectively with themselves, to be self-educated and to collaborate within the classroom.

#### **Learning outcome 3**

"Evaluate the space implementation in terms of the role of teacher as guide and observer". Teachers play an important role in the application and success of the methods, as well as their interaction with the physical environment, is extremely important for the comfort and development of their teaching role.

#### **Learning outcome 4**

"Evaluate furniture and materials in terms of implementation of teaching method". The didactic materials, as well as the furniture, are considered the tools manipulated by students for their own learning.

Montessori emphasizes the measure, color, and texture of the didactic materials. Although STEM and Multiple Intelligences do not have a specification for the materials, they do emphasize the importance of furniture in the development of the method.

#### **Learning outcome 5**

"Evaluate the learning environment design according to the teaching method". The Prepared Environment as Montessori describes it, is the place designed to simplify self-learning and exploration by the child. From the literature review it was observed that design of the space affects children's development, creativity and motivation towards education.

At the end of the survey three open-ended questions were given, providing specific information regarding teachers' experiences as educators and users of teaching methods. Basically the questions compile the overall information of each Teaching method, assessing their interaction with the learning environment as well as among each of them.

## **2. Hypotheses Development**

H1: The distribution of the spatial facilitates students' skills and abilities positively.

H2: Relationship of space design with education model will differ between respondents' opinion.

H3: The responses will differ in relation to the application of the educational models in terms of the interior space design between the institutions.

### **Problem Statement**

Pre-K educational models and philosophies are changing fast but still most of the students study in the conventional classrooms. Some of the current learning spaces are designed for a unidirectional and



passive teaching without being based on an educational model while at the same time children's interests, lifestyles and mentalities are evolving. We easily forget how built spaces influence children's development and special attention is often not given to the use of specific guidelines for preschool learning spaces design, leaving behind the idea of what a Pre-K refers. Therefore it is important for a quality education to create a learning space based on an educational model, where children are provided with the necessary tools and spaces for an effective teaching-learning process (Partnership for the 21st Century Learning, 2017), as well as teachers are offered with the proper materials to apply the educational model and develop their role.

## Methodology

### Selection Of The Subjects

This study was carried out to evaluate learning spaces for children aged 3 to 6, in terms of interior design. Three different kindergartens were selected randomly in the metropolitan city of Ankara, with the purpose of evaluating the application of design principles or recommendations of three alternative teaching models at the chosen kindergartens. The kindergartens were selected based on the alternative teaching models they applied, as this are the essential part of the theoretical framework and the basis of the model and evaluation. Each school worked under one of the three selected models, being these "Minik Devler Anaokulu" - STEM Education, "Maya Çocuk Yıldız" - Multiple Intelligences Theory and "Binbir Çiçek" - Montessori Model. A survey was conducted in this study in order to provide more accurate information, taking into account the opinions of 24 educators of each educational institution, who teach at the 3-6 year old classrooms.

Characteristics	Participants	Percent
<b>Gender</b>		
Female	69	95.8
Male	3	4.2
Total	72	100.0
<b>Education</b>		
High school	21	29.2
Bachelor	33	45.8
Master	18	25.0
PhD	-	--
Total	72	100.0
<b>Work Experience</b>		
1-5 years	48	66.7
6-10 years	18	25.0
More than 11 years	6	8.3
Total	72	100.0
<b>Teaching model applied at the current working place</b>		
STEM Education	24	33.3
Multiple Intelligence	24	33.3
Montessori Model	24	33.3
Total	72	100.0

Table 1. Demographic information

Table 1 illustrates that the highest percentage of participants were females 95.8%, while males were 4.2%. In this study the highest percentage of participants hold a Bachelor degree, which is 45.8%; followed by a 29.2% of the participants who hold a High school diploma; whereas lowest percentage of participants holds a Master degree and 0% of the participants was a PhD holder. Majority of participants have 1-5 years' work experience, which was 66.7%, followed by a 25.0% belonging to participants with 6-10 years' work experience while only 8.3% have more than 11 years' work experience. Equal percentage of participants applied the teaching model at the current working place that is 33.3%.

### Spatial Setting

Furthermore, for the purpose of gathering precise data three kindergartens were selected in the metropolitan city of Ankara, Turkey. By means of the three study cases, quantitative analysis, data collection and analysis of learning space interior space design could be done. A designed survey was administered to a sample group of 72 teachers in order to collect concrete and accurate information.

### Design Of The Questionnaire

The survey consisted of three sections. The first section consisted of four questions aimed at determining general information of the participants, concerning their gender, level of education, work experience and teaching model applied in their current working place. The second section consisted of 5 common variables among the alternative teaching models and below each of different statements were





presented. Each statement evaluates the suitability of the common aspects from a range of 1 to 5, all of this from an objective perspective. The third section consisted of three open ended questions. The subjects were asked to provide their opinions of the strengths and limitations of the learning space in terms of interior design, as well as provide their opinion about the effects of learning space on children' skills development.

The technique of providing two types of questions makes the result more fruitful, on one side the closed questions provide the required answers and keep the analysis easy and on the other side the open ended questions provide answers that have not been suggested, but rather answers that the respondent can give in his/her own words. This type of questions offer qualitative information, allow infinite number of possible answers collecting more details and help to understand how respondents think.

The statements were developed according to the principles of the models. For the statement "Application of teaching model in the learning space" has been structured according to how the space contributes or limits the application of the teaching model. The statement "Space implementation in terms of the role of student as an active agent" has been proposed based on a common principle among the different models, which is to promote the role of the student as an active agent in the learning space. For the statement "Space implementation in terms of the role of teacher as guide and observer" this was structured according to teacher's role in the three selected models, as aforementioned, the student is active and the teacher becomes a guide who arrange the space to facilitate education. The statement "Furniture and materials in terms of implementation of the teaching model" has been structured according to the importance of materials within the classroom for the purpose applying correctly the models, and for the last statement "Learning space design according to the teaching model" has been structured based on how the design of the space affects the application of the teaching model.

#### Evaluation of The Data

In total, 72 questionnaires were distributed and 72 were received back. How the application of the alternative teaching model and the elements within learning spaces was divided into five categories with their respective statements; respondents were asked to fill the required information. Following are the answered categories and their results.

Statements	Very Suitable	Suitable	Neutral	Less Suitable	Non-suitable
Frequency (%)					
Educates students in different courses	54 (75,0)	15 (20,8)	3 (4,2)	-	-
Furniture corresponds to model principles	42 (58,3)	18 (25,0)	9 (12,5)	3 (4,2)	
Technological tools match with model principles	24 (33,3)	9 (12,5)	30 (41,7)	3 (4,2)	6 (8,3)
Offers flexibility to fit different lessons	51 (70,8)	15 (20,8)	6 (8,3)	-	-
Provides freedom in activities meeting children's needs	54 (75,0)	15 (20,8)	3 (4,2)	-	-
Facilitates a creative space and free play	48 (66,7)	15 (20,8)	6 (8,3)	3 (4,2)	-
Allows student to be an active agent in learning process (significant learning)	60 (83,3)	12 (16,7)	-	-	-
Total %	66,07%	19,63%	11,31%	1,8%	1,19%

Table 2. Evaluate the application of teaching model in the learning space

According to Table 2. Evaluate the application of teaching model in the learning space, 2, 66.07% of the participants consider the application of the model in the learning space very suitable, while only 1.19 % considers the application of the model in the learning space non-suitable.

Statements	Very Suitable	Suitable	Neutral	Less Suitable	Non-suitable
Frequency (%)					
Space empowers students to interact more effectively with themselves	60 (83,3)	9 (12,5)	3 (4,2)	-	-
Space arrangement allows children to choose materials independently	51 (70,8)	12 (16,7)	6 (8,3)	3 (4,2)	
Collaboration and communication within the classroom is encouraged	57 (79,2)	12 (16,7)	3 (4,2)	-	-



Creative and innovative self-teaching materials	45 (62,5)	21 (29,2)	6 (8,3)	-	-
School furniture dimensions match students' anthropometry	60 (83,3)	6 (8,3)	6 (8,3)	-	-
Space fosters self-confidence.	60 (83,3)	9 (12,5)	3 (4,2)	-	-
Space promotes curiosity and interest in the learning space	36 (50,0)	27 (37,5)	6 (8,3)	3 (4,2)	-
Total %	73,2%	19,06%	6,54%	1,2%	-

Table 3. Evaluate the space implementation in terms of the role of student as an active agent

According to Table 3. Evaluate the space implementation in terms of the role of student as an active agent, 3 73.2% of the participants consider the application of the model in the learning space very suitable, while none of the participants consider the space implementation in terms of the role of student as non-suitable.

Statements	Very Suitable	Suitable	Neutral	Less Suitable	Non-suitable
Frequency (%)					
Teachers can interact more effectively with students within the space	60 (83,3)	9 (12,5)	3 (4,2)	-	-
Dimension space allows teacher to guide and observe students from every area	66 (91,7)	6 (8,3)	-	-	-
Collaboration and communication within the classroom is encouraged	63 (87,5)	6 (8,3)	3 (4,2)	-	-
Technological tools meet teachers' needs	33 (45,8)	12 (16,7)	18 (25,0)	6 (8,3)	3 (4,2)
School furniture and teaching materials meet teachers' needs	45 (62,5)	15 (20,8)	9 (12,5)	3 (4,2)	-
Space offers opportunities to strengthen the student-teacher relationship	51 (70,8)	12 (16,7)	9 (12,5)	-	-
Total %	73,6%	13,88%	9,73%	2,1%	0,69%

Table 4. Evaluate the space implementation in terms of the role of teacher as guide and observer

According to Table 4. Evaluate the space implementation in terms of the role of teacher as guide and observer, 73.6% of the participants consider the space implementation in terms of the role of teacher as guide and observer very suitable, while only 0.69% of the participants consider it as non-suitable.

Statements	Very Suitable	Suitable	Neutral	Less Suitable	Non-suitable
Frequency (%)					
Concrete materials (real life)	51 (70,8)	21 (29,2)	-	-	-
Promote self-education	51 (70,8)	21 (29,2)	-	-	-
Aesthetic and creative	45 (62,5)	24 (33,3)	3 (4,2)	-	-
Use of technological tools	24 (33,3)	18 (25,0)	12 (16,7)	6 (8,3)	12 (16,7)
Integrates contents of the subjects	15 (62,5)	6 (25,0)	2 (8,3)	1 (4,2)	-
Arranged according to different disciplines	45 (66,7)	21 (29,2)	3 (4,2)	-	-
Self-correcting materials (puzzles, Legos)	60 (83,3)	9 (12,5)	3 (4,2)	-	-
Fosters involvement of students in learning process	57 (79,2)	6 (8,3)	9 (12,5)	-	-
Total %	66,14%	23,97%	6,25%	1,56%	2,08%

Table 5. Evaluate furniture and materials in terms of implementation of teaching model

According to Table 5. Evaluate furniture and materials in terms of implementation of teaching model, 66.14% of the participants consider the furniture and materials in terms of implementation of the teaching model very suitable, while only 2.08% of the participants consider it as non-suitable.



Statements	Very Suitable	Suitable	Neutral	Less Suitable	Non-suitable
Frequency (%)					
Big and open spaces	51 (70,8)	21 (29,2)	-	-	-
Contact with the exterior (windows, doors)	42 (58,3)	18 (25,0)	6 (8,3)	3 (4,2)	3 (4,2)
Subdivided into thematic areas	48 (66,7)	18 (25,0)	6 (8,3)	-	-
Promotes movement around the space	51 (70,8)	12 (16,7)	9 (12,5)	-	-
Supports use of technology into class development	27 (37,5)	21 (29,2)	9 (12,5)	6 (8,3)	9 (12,5)
Organized, aesthetic and clean	51 (70,8)	18 (25,0)	3 (4,2)	-	-
Promotes children's independence in exploration and the learning process	51 (70,8)	18 (25,0)	3 (4,2)	-	-
Creative space	48 (66,7)	18 (25,0)	6 (8,3)	-	-
Provides flexible spaces to carry out the projects	51 (70,8)	18 (25,0)	3 (4,2)	-	-
Generates spaces to play and experience	30 (41,7)	27 (37,5)	9 (12,5)	6 (8,3)	-
Total %	62,5%	26,25%	750%	2,08%	1,67%

Table 6. Evaluate the learning space design according to the teaching model

According to Table 6. Evaluate the learning space design according to the teaching model 62.5% of the participants consider that the learning space design and its relation with the educational model is very suitable, while only 1.67 % of the participants consider it as non-suitable. After analyzing every statement from a general perspective, following a table is presented with educators' responses regarding their opinion of every statement in terms of the alternative teaching model they apply within it,

Statement	STEM Education	Multiple Intelligence	Montessori Model
	Mean*	Mean*	Mean*
Application of teaching model in the learning space	4.16	4.71	4.55
Space implementation in terms of the role of student as an active agent	4.39	4.71	4.76
Space implementation in terms of the role of teacher as guide and observer	4.27	4.81	4.64
Furniture and materials in terms of implementation of the teaching model	4.25	4.68	4.57
Learning space design according to the teaching model	4.27	4.73	4.33

Table 7. Educators' perspective in terms of the teaching model applied

\*Statements means ranged from 1 to 5, with higher numbers representing more positive responses.

In the comparison above, the perception of each of the statement differed moderately among the participants of each teaching model. The lowest mean obtained after the analysis is 4.16 and the highest 4.81, which shows that the interaction of the learning space with the teaching models is very suitable, with an overall average of 4.5. Regarding the statement "expectations and needs in the learning space", three open-ended questions were suggested in the questionnaire, similarities and differences were determined by comparing and evaluating the answers provided by the participants.

Concerning the question - Could you indicate the strengths of existing learning spaces that contribute to teaching model implementation? The general responses obtained through the survey were that the material implemented in the classroom corresponds to the model and is suitable for students' age and development, while also the materials and shelves are reachable for children and enable them to get what they need without needing to ask adults for help since furniture is designed in accordance with student's natural scale. Likewise the indoor space match with the design criteria contributing to the correct application of the model as this is large enough, creative and entertaining, giving the opportunity to perform different activities and also the classrooms are well connected and they are reachable from every place.



In relation to the question - Could you indicate the limitations of existing learning spaces in terms of interior architecture? The general responses obtained through the survey were that classes should be on the ground floor so that they can connect easily with outdoors, fostering activities that integrate contact with nature. Also some classrooms don't allow children to move freely within the learning space and there are not enough materials and games that involve the technological part in the classroom.

And for the last question - Do you think the learning space design affect overall students' skills development? Why? The general responses obtained through the survey are that well-designed learning spaces contribute children's physical and cognitive development while promote learning and make children to think and analyze, also class design contributes to children development because allows children to educate themselves and learn who they are and what they want. In conclusion, findings indicate that the interior design of a kindergarten classroom affects overall the development of children's skills as well as their motivation towards learning.

### Conclusion and Discussions

This study has sought to respond to a number of research problems related to the elements within the learning environment and how the application of the teaching method affects the interior design of the classroom. Applying a research tool facilitated to collect accurate information by gathering data from an administered survey to 72 participants of three different educational institutions in the metropolitan city of Ankara, Turkey. For each teaching model one institution was chosen, these are "Minik Devler Anaokulu" - STEM Education, "Maya Çocuk Yıldız" - Multiple Intelligences Theory and "Binbir Çiçek" - Montessori Model.

From the survey results and the three hypotheses could be supported through noticing how the distribution of the environment facilitates students' skills and abilities positively. This was perceived by providing the interior space of a classroom organized into different areas that provide children opportunities. The organization into different areas was as well one of the item analyzed through the survey, which most of the teachers classified as part of their learning environment. For the second research hypothesis was reflected that the relationship of learning environment with teaching method differed between respondents' opinion. Having different study cases contributed to respond this hypothesis, since the respondents interact with environments distributed in different areas within the educational institutions and the methods applied within learning environments are different. For the third research hypothesis it was observed that the influence of the interior design of the learning environment contributes the application of the teaching methods. When the classroom offers flexibility to adapt its spaces to the teaching method requirements, the application of these is effective and fulfill its objectives. The findings from the analysis and data gathered from the survey respond to the study's research problems and help to achieve its aim, which is to provide interior space design characteristics for an effective learning environment design within preschool classrooms, based on three alternative teaching methods. These findings have several significant implications for both evaluating and creating an effective interior design of a learning environment, particularly for the purposes of implementing the elements within learning spaces as well as satisfying children's needs. After analyzing the data collected, the four hypothesis of the research could be proven.

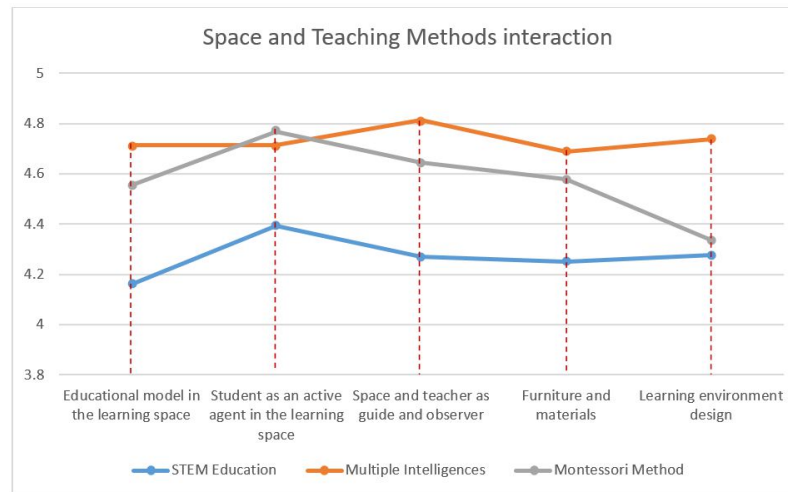


Figure 1: Space and teaching methods interaction



The graph represented above shows a comparison of the results obtained after analyzing the data of the surveys. As can be seen in the evaluation of spaces in terms of the application of the alternative model, the results of the evaluations show that the relationship between the variables surveyed has some equality in importance and influence. In terms of the graph analysis, STEM Education with a mean of 4.27 was considered as *Suitable* according to the educators in the kindergarten; on the other hand Multiple Intelligences had a total mean of 4.73, considering it as *Very Suitable* from educators' perspective and Montessori Model with a total mean of 4.58 was considered as *Very Suitable* as well. However, although these three models are applied at different places, a majority of participants have similar perspectives regarding the application of the model and influence of the physical space. The findings from the analysis respond to the study's research problems and help to achieve its aim, which is to analyze the interior design of a learning space based on three alternative teaching models applied nowadays. These findings have several significant implications for both evaluating and creating an effective interior design of a learning space, particularly for the purposes of implementing the elements within learning spaces as well as satisfying children's needs.

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