The Impact of Classroom Design According TEACCH System in Dealing with Behavioral Problems of Severe Autism Spectrum Disorder' Students

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Abstract
This study aimed to identify the impact of classroom design for students with severe autism spectrum disorder according to TEACCH System in the United Arab Emirates, on the ability of the teachers to deal with behavioral problems and the effect this design in decreasing or increasing negative behaviors from the point of view of teachers. In this study, a mixed-methodology approach of quantitative and qualitative methods is used to investigate the topic, and in order to achieve the objectives of the study, the researcher prepared two special tools that included: (I) TEACCH System's Effectiveness Questionnaire, (II) Identifying the Needed Modifications (Semi Structured- Interview).
The study sample consisted of 27 teachers of students with severe autism spectrum disorder; the data collection was done by distributing online questionnaires and sharing an electronic link to the interview in the presence of the researcher with the participants in the study to explain and answer any question.
The study's findings revealed a low evaluation for effectiveness of TEACCH System classroom design in the current situation in ability to deal with behavioral problems with an average of (1.85) out of (4.00). In addition to confirm the need for a method of building, designing, and preparing classroom contents other than the method currently used within TEACCH System.
Keywords: TEACCH System, Autism Spectrum Disorder, Classroom Design, Behavioral Problems, Emirates.

Introduction
Improving the quality of education, training, and behavior for students with autism spectrum disorder requires a focus on creating a positive classroom environment (Virginia, 2015). According to the literature, there are basic elements that must be considered when designing

the ASD environment, including (i) flexibility and adaptability, (ii) clarity and predictability of the environment, (iii) non-distracting, (iv) controllable, (v) sensory-motor attuned, and (vii) description of the spatial requirements and assets, which are primarily organized according to the needs of people with autism spectrum disorder (Tola et al., 2021).

According to Branigan-Pipe (2016), any excessive or unwanted distraction can impair a student's ability to learn. The background and surrounding environment that most of us can overlook or cope with will actually act as a barrier between the ASD student and the teacher, impeding the child's development even further.

"92 % of teachers consider classroom design has an impact on student learning," according to a Tech Learning (2015) survey. These teachers believe that there is a direct connection between classroom design and student performance, behaviors, and engagement (Block, 2018).

The commonly held belief is that individuals with autism spectrum disorder who exhibit the most severe expressing behaviors have lower nonverbal IQs and less developed verbal ability (Gray et al., 2012). When a communication breakdown occurs, an individual with ASD's inability to competently and spontaneously communicate their wants and needs in a clear and consistent manner is thought that lead to some of behaviors such as disruptive and aggression (Ganz et al., 2009).

The list of design issues for students with autism spectrum disorder in the classroom includes: 'Simple layout: calm, ordered, low stimulus spaces, no confusing large spaces; indirect lighting, no glare, subdued colors; good acoustics, avoiding sudden/ background noise; robust materials, tamper-proof elements, and concealed services; possibly risk assessments;' comfortable indoor and outdoor locations to withdraw and calm down (McAllister & Maguire, 2012).

Sensory sensitivity to visual, auditory, tactile, and is common in students with autism spectrum disorder (Crasta et al., 2020). As a result, one of the many challenges for students with autism spectrum disorder is simply feeling at ease in their own environment. The built environment can be difficult, confusing, and even dangerous for such students (Whitehurst, 2007).

TEAACH System (Structured Teaching)
Is a method of organizing the classroom and adapting teaching processes and styles to accommodate autism spectrum disorder' students. It is a method of organizing educational programs that considers the skills, deficits, and interests of people with ASD. Instead of judging student appropriateness or compatibility with some implicit or explicit model, emphasis is placed on understanding and meeting individual needs (Mesibov & Howley, 2018).

Scope of the Study and Current System
The scope of this this is Zayed Higher Organization for People of Determination [ZHO], in the United Arab Emirates, specifically inside: Alain Autism Center, where all classes are designed

in a unified system according to TEACCH System, whether the class is for children or adults, high-achieving students or severe-needs students, and the only thing different is the size of the chairs and tables.

On the other hand, the classrooms are prepared before the beginning of the school year for students and before they join the classes, which may put the teacher in the dilemma of inappropriateness of the classroom to the needs and behaviors of the students. On the contrary, the classroom environment may constitute a fertile place for increasing behavioral problems.

Questions of the Study
1. Does the classroom design based on TEACCH System negatively affect the behaviors of severe autism spectrum disorder' students from the teachers' point of view?
2. Are there needed changes in the classroom system to be more appropriate for students with severe autism spectrum disorder form teachers' perspective, and what are?

Hypothesis of the Study
There is no negative impact of class design based on TEACCH System on the behavior of students with a severe autism spectrum disorder from teachers' perspective (RQ1).

Limits of the Study
This study is limited to the classroom teachers of students with severe autism spectrum disorder, whether they are current teachers or have previously dealt with severe cases.

Methodology
The researcher used the mixed mode method, where he collected quantitative data by questionnaire in addition to qualitative data by semi-structured interview. The researcher will begin with:
Collecting quantitative data from teachers regarding the effectiveness of the TEACCH System.
As well as identifying the most important and necessary classroom modifications for students with severe cases in order to make it more suitable for them, meet their needs, and reduce their behavioral issues.

Objectives of the Study
The general objective of this study is to identify the impact of classroom design for students with autism spectrum disorder, especially severe cases, in a uniform way and according to TEACCH system, on students behaviors negatively, in addition to the extent to which the design according to the current system needs modifications to become more suitable for students, beside to determining the quality and nature of these modifications and the needs within the classroom, from the point of view of teachers' view.

Problem of the Study
Many students require modifications to the educational environment and adaptations to facilitate learning in order to succeed in school; this is especially more important for students with autism spectrum disorder (Kinnealey et al., 2012).

Classroom design can have a negative impact on the behavior of students with autism spectrum disorder in a variety of ways, including occupying spaces, moving through the building, flexibility of use, dealing with furnishings and materials, safety, and security, and can also have a negative impact on students' stress levels (Martin, 2016).

During the researcher's work as a teacher for students with severe autism spectrum disorder; noticed that students had a variety of behavioral issues that reverse to TEACCH System's basic structures and standards. These issues included throwing chairs, tables, materials, and tools, tearing or breaking pictures, flashcards, and tables, putting uneaten things in their mouths and eating them, random stirring, and getting lost while walking and colliding.

The study problem appears in next basic aspects:

(i)   Incompatibility of the classroom design (TEACCH) system with inappropriate student behaviors, particularly those of a severe nature, implies the difficulty of dealing with and addressing behavioral challenges within the current training and organizing system of classes.

(ii)   Inability to complete training and educational activities for pupils, as well as enhance their skills and abilities, particularly if all students in a class have multiple behavioral issues.

Importance of the Study

The significance of this study is manifested in two aspects

(i) *Theoretically*, Previous studies related to assessing the effectiveness of classroom design according to TEACCH System may be generally limited and non-existent in the Arab region. Thus, this study may be unique and a good addition to designing classroom of autism spectrum disorder.

(ii) *Practically*, This study aims to provide a new perspective on the fundamentals of designing and constructing an educational environment for a student with autism spectrum disorder, based on his needs and the severity of his disorder rather than on his general classification, as well as solutions and contributions to improving positive behaviors.

Contributions of the Study

This study presents scientific and practical additions and contributions in the field of working with students with autism spectrum disorder. These contributions are shown in the following points:

i.   Introducing a new system in building and designing the classroom for students with autism spectrum disorder, especially in severe cases, that is more appropriate to the needs, problems and abilities of students, and the classroom system.

ii.   Treating severe autism students with multiple behavioral problems, especially disruptive behavioral problems.

iii.   Increasing the teacher's ability to manage and control the classroom by reducing audio, visual and spatial stimuli and presenting them at the most appropriate time and degree.

Literature Review

By reviewing the literature and previous studies, the limited studies related to the impact of classroom design for students with autism spectrum disorder in general and in particular, the role of classroom building according to TEACCH System and its relationship to behavioral problems within the classroom, whether in the Arab region or globally, was revealed. Next, we present some of the proposed studies:

In a study carried by Barbara, 2020, it aimed to identify considerations and guidelines of designing the environment for students with autism spectrum disorder and to provide a set of adjustments to make the classroom more students friendly.

The study presented over one model and requirements in the classroom and provided a set of instructions and notes, the most important of which are: The most critical elements that require immediate attention are: lacking partitioning of space inside the room, which caused greater anxiety while changing activities within the room; difficulty of finding a way around the area; no visually identifying the zones by pointing to them; unsuitable colors; the equipment and movable pieces were in bright, assertive colors that were unmistakably irritating; insufficient and uneven lighting, no adjustability, zoning, or color or intensity change, in addition to general confusion produced by a lack of adequate equipment and an overabundance of systematic aids on display at the same time for varied goals. The study extracted important points in the classroom's design for students with autism spectrum disorder, like: (i) Working with students of autism spectrum disorder requires smaller spaces for groups of 4-6 people. (ii) All the changes made to the designed room are aimed at adapting the space of the existing room to the specific needs of the students with autism spectrum disorder learning in it. The most important changes are appropriate space zoning, which allows for a slight alleviation of the discomfort caused by working in a group with too many participants. (iv) the diversity of the floor, both in terms of texture, color, and material, will allow students to turn themselves organoleptic ally, as will the appropriate colors of walls and equipment.

Delmolino and Harris (2012) conducted a study titled Matching Children on the Autism Spectrum to Classrooms: A Guide for Parents and Professionals. This study aimed to provide a suitable spatial educational alternative for students with autism spectrum disorder based on four criteria, one of which was the educational and classroom place's suitability for the student's needs and features. The study showed that learners who display dangerous or disruptive behaviors may have fewer placement alternatives, as these urgent demands often cause a lot of resources and experience. Despite a learner's ability to take part in the educational or social experiences provided by a particular placement, his or her behavior may prevent him or her from moving into a less restrictive environment. As noted, data from the student's individual strengths and weaknesses will help determine which classroom characteristics should be adjusted or implemented. This study concluded that, in reality, most educational settings lack the level of expertise, resources, and flexibility required to provide appropriately matched and flexible services. Every student on the spectrum deserves responsive services. Given because of this current limitation, individual interventions at a classroom's student level may meet the intent of a child matched to a treatment; the expectation that this can be done on a larger scale in the classroom is still a question.

The Zig-gurat Model provides additional evidence of the impact of the physical classroom environment on students with ASD (Aspy and Grossman, 2011). The model is a standard intervention planning tool that includes a hierarchical approach that special education educators can use to help students with ASD develop their strengths and to meet their problems and limitations, and it looks at (1) sensory aspects, (2) reinforcement, (3) structure

and visual/tactile supports, (4) task demands to remove obstacles, and (5) skills to teach that address skill deficits.

Sound, light, personal space, textures, and movement needs are all highlighted as environmental stresses. Within the lists of "obstacles" and "deficits," "sensory" is mentioned in both of the top two "blocks" (i.e., task demands and skills to teach). The concerns (i.e., challenges) are addressed, but the best way to construct the class space is not provided, as is the case with other tools (Martin, 2016).

The National Professional Development Center (NPDC), (2013) selected strategies with a 'confirmed evidence foundation" that are recommended for interacting with students with ASD. Their 43 autism web modules include evidence-based approaches, but only one, "visual aids," directly addresses the physical classroom environment. The National Standards Project (National Autism Center) also suggests evidence-based approaches that result in data analysis to determine intervention effectiveness. Findings show that 'systematic instruction works to teach individuals with ASD, across ages and abilities, a varied range of skills and behaviors,' as identified by (Strain et al., 2011).

Instruments of the Study
(I)TEACCH System's effectiveness in dealing with behavioral problems in the classroom of students with a severe autism spectrum disorder.
(II)The needed modifications to building a classroom for students with severe autism spectrum disorder (Semi-structured interview).
The researcher prepared these tools after reviewing many theoretical and practical studies related to the study, reviewing the items they contain, summarizing and presenting them to people with specialization and experience, and the contents of these tools below.

Table 1

TEACCH System's Questionnaire Items

Items	Paragraphs
1	The classroom environment is pre-planned for students before they joined it.
2	The classroom is designed following student's evaluation period and adaptation to the class.
3	In all classes, the classroom is designed using specific criteria and principles.
4	TEACCH System's environment is designed to address the behavioral issues of students in the classroom.
5	The classroom design accommodates needs and abilities of all students in the class.
6	The classroom environment is appropriate for students of various ages and sizes.
7	Classroom design according to TEACCH System contributes to improving the ability to train/ teach students.
8	There is flexibility in redesigning the classroom according to the teacher's desire and according to emergency and emerging conditions.
9	TEACCH environment in the classroom needs some changes in the corners and assets in order to be more suitable for the students.
10	Overcrowding in the classroom with many tools, materials, and teaching aids leads to an increase in the behavioral problems such as impulsivity, distraction, and bumping into things.
11	Designing a classroom environment according to the current procedures leads to an increase in students' positive behaviors such as following instructions, adhering to rules.
12	Building the classroom according to TEACCH System helps reduce undesirable behaviors of students such as: throwing tools, breaking means, tearing, and destroying materials, trying to climb on objects such as a table.
13	Designing the class according to the procedures currently used is the best way to develop aspects of learning, acquiring skills, and possessing independent abilities for students.
14	The gradual building of the classroom after students join it is the best option to avoid behavioral problems and develop positive aspects of students.

Table 2
Semi-Interview Items

Items	Paragraph
1	Does the classroom design of your severe students generally need to be modified? **A**- Yes **B** – No **C**- Yes, to a small degree
2	Do you think that the time for preparing the classroom before joining the student is appropriate? **A**- Yes **B**- Sometimes yes **C**- Sometimes no **D**- No
3	Does building the classroom according to TEACCH System consider the individual needs and problems of students? **A**- Yes to a large extent **B**- Yes to a small extent **C**- No
4	Do you see a need to reduce the number of training and support tools in the classroom? **A**- Yes **B**- No
5	Do you think that the facilities in the classroom are appropriate for the ages and sizes of your students? **A**- Yes **B**- No
6	Does the number of educational corners in the classroom need to? **A**- reduce **B**- increase **C**- or fit
7	What is the most appropriate time to building a class for your students from your point of view? **A**- Before the start of the school year **B**- The beginning of the school year **C**- After the student assessment period **D**- Another time ( )
8	What changes are needed for your students in the aspects of tables, images, and training tools from your point of view?
9	What are the unavailable additions that your students need in the corners, tools, or materials from your point of view?

Validity and Reliability of the Study Instruments

In order to verify paragraphs of the study tools and their relevance to the objective of the study, they were presented to 11 arbitrators and extracted the validity of the content, in addition to conducting a pilot study on 10 participants from outside the actual study sample and applying it twice within 15 days and extracting Reliability Cronbach's Alpha & Pearson Correlation, and All statistical scores appeared to be usable within this study, showed below.

Table 0

Reliability Data: TEACCH System's effectiveness

Reliability Statistics	
Cronbach's Alpha	N of Items
.958	14

Correlations

		test_1	test_2
test_1	Pearson Correlation	1	.925[**]
	Sig. (2-tailed)		.000
	N	10	10
test_2	Pearson Correlation	.925[**]	1
	Sig. (2-tailed)	.000	
	N	10	10
**. Correlation is significant at the 0.01 level (2-tailed).			

Data Analysis and Results

To collect data, study tools were distributed electronically to the sample participating in the study, which numbered 27 teachers of students with severe autism spectrum disorder, with 100% complete responses and the results are presented in the tables below.

RO1:To answer question number one which stated: Does the classroom design based on TEACCH System negatively affect the behaviors of severe autism spectrum disorder' students from the teachers' point of view?

HO: There is no negative impact of class design based on TEACCH System on the behavior of students with a severe autism spectrum disorder from teachers' perspective.

Table 5
Descriptive statistics for the effectiveness of TEACCH System

Rank	N	Items	Mean	Std. Deviation	Level
1	8	There is flexibility in redesigning the classroom according to the teacher's desire and according to emergency and emerging conditions.	3.15	.368	High
2	7	Classroom design according to TEACCH System contributes to improving the ability to train/ teach students.	2.77	.710	Medium
3	6	The classroom environment is appropriate for students of various ages and sizes.	2.50	.860	Medium
4	13	Designing the class according to the procedures currently used is the best way to develop aspects of learning, acquiring skills, and possessing independent abilities for students.	2.27	.533	Medium
5	5	The classroom design accommodates needs and abilities of all students in the class.	2.23	.863	Medium
6	12	Building the classroom according to TEACCH System helps reduce undesirable behaviors of students such as: throwing tools, breaking means, tearing, and destroying materials, trying to climb on objects such as a table.	1.92	.484	Low
7	11	Designing a classroom environment according to the current procedures leads to an increase in students' positive behaviors such as following instructions, adhering to rules.	1.78	.577	Low
8	4	TEACCH System's environment is designed to address the behavioral issues of students in the classroom.	1.74	.447	Low
9	2	The classroom is designed following student's evaluation period and adaptation to the class.	1.52	.700	Low
10	9*	TEACCH environment in the classroom needs some changes in the corners and assets in order to be more suitable for the students.	1.48	.509	Low
11	3*	In all classes, the classroom is designed using specific criteria and principles.	1.44	.506	Low

12	10*	Overcrowding in the classroom with many tools, materials, and teaching aids leads to an increase in the behavioral problems such as impulsivity, distraction, and bumping into things.	1.07	.267	Low
13	14*	The gradual building of the classroom after students join it is the best option to avoid behavioral problems and develop positive aspects of students.	1.07	.267	Low
14	1*	The classroom environment is designed for students in advance before they join it.	1.00	.000	Low
		Total	1.85	.656	Low

Negative paragraph reverse corrected

Table 4 demonstrates that 9 of the 14 items had poor scores, and the overall efficiency of TEACCH System in dealing with behavioral difficulties in a class of students with severe autism spectrum disorder was rated as low as (1.85).

Based on the findings in Table 5, the null hypothesis stating that the class design based on TEACCH System has no negative impact on the behavior of students with severe autism spectrum disorder from the perspective of teachers is rejected. As a result, the alternative hypothesis is accepted, which means that the classroom design system negatively effects on students' behavior from the teachers' point of view.

RO2:To answer question number two which stated: Are there needed changes in the classroom system to be more appropriate for students with severe autism spectrum disorder form teachers' perspective, and what are?

The frequencies for the questions with alternatives, as well as the grouping of statements and answers for the open-ended questions were calculated, and Table 5 below shows the frequencies and results for the seven questions with multiple alternatives.

Table 5
Frequency of Interview

1-Does the classroom design of severe students generally need to be modified?

Answers	Frequency	Percent	Valid Percent	Cumulative Percent
No	1	3.7	3.7	3.7
Yes	18	66.7	66.7	70.4
Yes, in a small degree	8	29.6	29.6	100.0
Total	27	100.0	100.0	

2-Do you think that the time for preparing the classroom before joining the student is appropriate?

Answers	Frequency	Percent	Valid Percent	Cumulative Percent
No	14	51.9	51.9	50.0
Sometimes no	5	18.5	18.5	70.4
Sometimes yes	6	22.2	22.2	92.6
Yes	2	7.4	7.4	100.0
Total	27	100.0	100.0	

3-Does building the classroom according to TEACCH System consider the individual needs and problems of students?

Answers	Frequency	Percent	Valid Percent	Cumulative Percent
No	19	70.4	70.4	70.4
Yes	1	3.7	3.7	74.1
Yes, in a small degree	7	25.9	25.9	100.0
Total	27	100.0	100.0	

4- Do you see a need to reduce the number of training and support tools in the classroom?

Answers	Frequency	Percent	Valid Percent	Cumulative Percent
No	8	29.6	29.6	29.6
Yes	19	70.4	70.4	100.0
Total	27	100.0	100.0	

5- Do you think that the facilities in the classroom are appropriate for the ages and sizes of students?

Answers	Frequency	Percent	Valid Percent	Cumulative Percent
No	17	63.0	63.0	63.0
Yes	10	37.0	37.0	100.0
Total	27	100.0	100.0	

6- Does the number of educational corners in the classroom need to?

Answers	Frequency	Percent	Valid Percent	Cumulative Percent
Fit	8	29.6	29.6	29.6
Increase	1	3.7	3.7	33.3
Reduce	18	66.7	66.7	100.0

| Total | 27 | 100.0 | 100.0 | |

7- What is the most appropriate time to start building a class for students from your point of view?

Answers	Frequency	Percent	Valid Percent	Cumulative Percent
After the student assessment period	25	92.6	92.6	92.6
At the beginning of the school year	1	3.7	3.7	96.3
Before the start of the school year	1	3.7	3.7	100.0
Total	27	100.0	100.0	

According to table 5, all of the answers to the seven questions support and confirm the need for a method of building, designing, and preparing classroom contents other than the method currently used within TEACCH System, and among the most notable of these answers are: responses to question No. 7, "What is the most appropriate time to start building a class for students from your point of view?

A total of 25 people responded that the most acceptable time is following the student assess assessment period, with a response rate of almost 93 %.

In response to the two open-ended questions, which stated, (I) "What changes are needed for students in the aspects of tables, images, and training tools from your point of view?" (II) "What are the unavailable additions in the class that students need in corners, tools or materials from your point of view?"

All of the comments were unique and varied, all in the interest of class design and the necessity for it. The replies were filtered and sorted in order to answer the main question, which was about the needs of a class of pupils with severe autism spectrum disorder according to the following points:

(I) Establishing a sensory area or space within the classroom that fits students' sensory needs and is connected to the aural, visual, and tactile stimulation of the student's condition.

(II) Reducing the number of training corners and attempting to merge them to increase classroom space.

(III) Reducing the quantity of illustrated educational schedules in the classroom to prevent student distraction and progressively increase attention and learning levels.

(IV) Replacing several communication files on the walls, one or two of which are dedicated for each student (PECS [Picture exchange communication system]), with one or two communication boards that cover the students' needs and reinforcing.

(V) Reducing the number of daily educational tasks and increasing the size of task images in exchange for a reduction in the number of tasks.

(VI) The need of daily sensory and behavioral therapy sessions aimed at promoting positive conduct and addressing the student's internal requirements.

(VII) Allowing the teacher to develop models that are consistent with the center's policies while also meeting the requirements and skills of the students rather than depending on unified illustrated models for students.

(VIII) Expanding the number of recreational and therapeutic activities available during the school day.

Results' Summary

By analyzing the statistics and the results of the tables related to the study questions, the following emerged:

i. The teachers' assessment of the classroom design according to TEACCH System in dealing with behavioral problems in the classroom of students with severe autism spectrum disorder was at a low degree.

ii. The assessment revealed that the current classroom construction method has a negative impact, leading to the emergence and exacerbation of social problems rather than their reduction.

iii. The majority of study participants were dissatisfied with how and when the classroom was built and designed for their students, and they desired to find a better method.

Recommendations and Conclusion

Building and equipping the classroom for students with autism spectrum disorder is the first and most important step to increase the harmony and interaction of the student within it. It also has a key role in contributing to increasing the student's ability to train, deal and control his behavioral problems. Therefore, based on the results of the study, those responsible for designing the classrooms, including administrators and teachers should taking into account the following:

(i)   Flexibility in the time of class preparation so that it is after a period of observation of the student from two to four weeks and an acceptable degree of identification of his needs, problems and abilities inside the class.

(ii)   The teacher is not obligated to design the classroom with standardized contents and tools approved by the administrative system of the center, but rather adopt what he deems appropriate for his students and design other purposes that seem uniquely necessary for his students.

(iii)   Reducing the number of educational corners and furniture in the classrooms and trying to integrate them within numbers suitable for educational skills and the individual student's need.

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