Architectural Design For Inclusive Schools
"Towards An Integrated Evaluation Methodology For Autism"

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ABSTRACT
A specific focus of government decisions in Egypt is for special needs children to gain access to advanced education. Enacting into legislation the principles of what to educate is only one means of ensuring the future of the welfare of the nation's children. To best serve children with special needs, a set of governmental recommendations are placed together, one of these was to guarantee the rights of children with disabilities and their inclusion into society through building their learning environment. Formal regulation guidelines set up to evaluate and rank inclusive schools to address the requirements of children with special needs.
The word special needs apply to the needs of a group of people living in any community who encounter challenges in carrying out their everyday activities. These conditions may be highlighted as physical challenges, developmental challenges, behavioral/emotional difficulties, and sensory impairments, or also as a combination of them. Autism is a form of special needs underlying the symptoms of behavioral challenges that are highly vulnerable to the environment to the extent of manipulating their behaviors and perception. The architecture of the building environment of autistics must reflect the learning opportunity's desires, needs, and skills.
The Egyptian government has to go down various routes to support individuals with autism for ensuring that the limitations are eliminated and requirements satisfied by evaluation strategies. Across several studies concerning autism, common aspects are considered by analyzing design guidelines that have been utilized. These aspects have been shared in several empirical studies will be consistent with the Egyptian regulation on the accomplishment of the research objective of integrating the formal evaluation criteria for inclusive schools.

KEYWORDS
Autism Spectrum Disorder; Autism in Egypt; Inclusive schools

1. INTRODUCTION

Architecture is a science and art that incorporates human expectations and actions. As an architect, you have to be aware of the dynamic aspects of 'need,' from the social and cultural manifestations to nature, environmental and financial, and political boundaries. This awareness is translated into rigorous regulation and finally into successful and reliable designs, modeling experiences that address the needs of all types of users.
The regulation does not exclude individuals with "special needs" in such accommodation. The utilization of space is explicitly allowed by the mixture of physical, emotional, and developmental capabilities a user requires. This capacity of explaining the architectural space

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has strong ramifications in physical, emotional, and developmental dimensions. People on the Autism Spectrum Disorder (ASD) may be among these endeavors.

The 2014 Constitution is the first Egyptian legislation to concede that individuals with atypical disabilities are right holders. It is also the first Egyptian constitution to specifically mention the privileges of rehabilitation and participation granted to children, as fundamental rights. Schools are prevented from discriminating against students who have disabilities. Schools are also required to have sufficient adequate living accommodation for people with disabilities.

Autism is a form of special needs disorder (see Figure 2), which is extremely environmentally responsive and may enhance or overpower its ability. From this point forward, the assessment of government guidelines was necessary to determine whether the criteria of Autistic students were met. These latest guidelines will evaluate and rank schools to address the needs of children with special needs. A systematic revision must then be performed in order to receive the correct recommendation to enhance their performance.

There was a lot of debate around specific design guidelines for people with ASD in the literature review. The most empirical literature on architecture was not focused on established medical expertise. Another applicable literature contains both observational studies and opinion polling from Second-party audiences, relying on input from individuals who do not have Autism, but interact with others who do (caregivers, teaching staff, family members, and medical professionals). On this particular subject, few studies have input directly from individuals with ASD.

The existing reviews may be valuable reference points for future research as the gaps can be used to render studies more successful. This paper will invest the current studies in an attempt to bring out a set of common themes shared by the most well-known nine empirical studies using Venn diagram intersection logics (Richer & Nicoll, Whitehurst, Avarez & Crabtree, Humphreys, Magda Mostafa, Vogel, Khare & Mullick, Brand, and Mcallister & Maguire). These Autism-Friendly Design Guidelines are all the interface values required for Autistic people in an inclusive environment. Such a package supports a viewpoint that is beneficial for ASD.

Research Problem:

In Egypt, it is hardly enrolling children with autism in mainstream schools as it does not accommodate their needs. The government has proposed criteria for evaluating and ranking schools to address the needs of autistic individuals, but significantly distinct from guidelines of literature review of Autism-friendly design.

Research Objectives:

1) Shed light upon the necessity of updating the governmental evaluating criteria to accommodate all array of special needs. 2) Suggested design considerations address autistic individuals and suitable for others. 3) Draw attention to the importance of further studies for addressing different forms of disabilities to promote universal design guidelines that respect our diversity.

Research Significance:

With the high expectation of accelerated Autism prevalence percentages in the future, it is becoming increasingly important to understand ways to handle this disability through architectural forms, in order to achieve their full potentials and remove their obstacles. New approaches to developmental disabilities should be adopted, with an emphasis on the possibility of improving built environments to encourage their educational process.

Since autistic people have atypical brain design that peculiarly interprets the environment, their surroundings have a significant influence on their behavior, communication skills, and perception. Thus the research target the early stage 6-12 years with high-functioning students with Autism disabilities (those with higher IQ and milder symptoms) that will be more able to cope with complex difficulties and resolve their impairment when the right environment is offered.

Research Hypothesis:

1) Egyptian regulations of inclusive schools tailored for the needs of physically challenged students rather than developmental ones. 2) Egyptian evaluation criteria do not suit the needs of autistic children.

Research Methodology:

This paper would use Venn diagram intersection reasoning to extract a set of similar themes shared by the most popular nine empirical studies (Richer & Nicoll, Whitehurst, Avarez & Crabtree, Humphreys, Magda Mostafa, Vogel, Khare & Mullick, Brand, and Mcallister & Maguire). The design guidelines and built environment aspects that are considered Autism-Friendly from existing literature articles will be compiled into a single set to be known as Autism-Friendly Design Guidelines. This set approximates a key perspective in Autism-friendly design literature, from which formulating the evaluation criteria is derived.

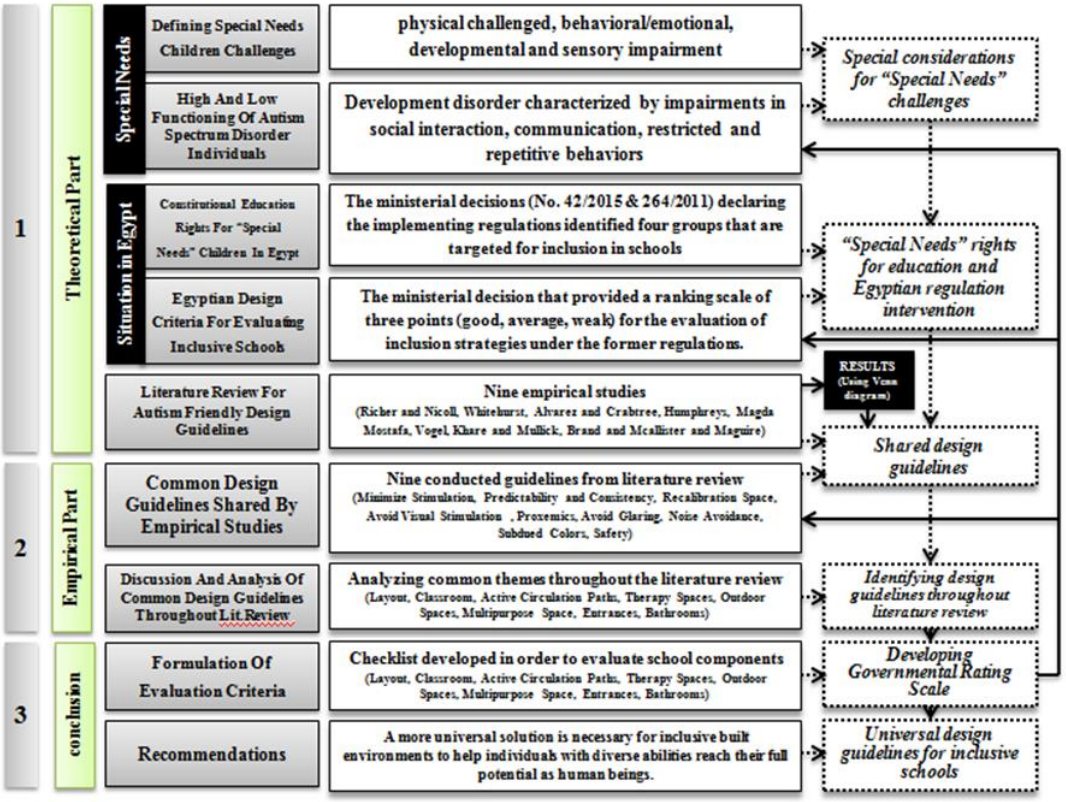


Figure 1, Structure of the Study (Source: The Author)

2. SPECIAL NEEDS CHILDHOOD CHALLENGES

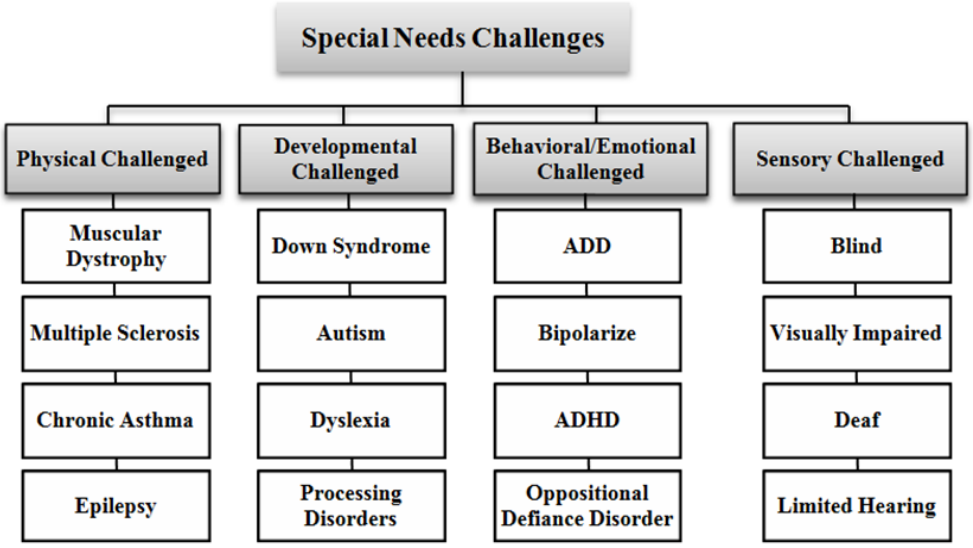


Figure 2, Forms of Special Needs Challenges and their manifestations (Source: https://www.verywellfamily.com/, accessed January 2021)

The term "special needs" refers to the needs of a group of individuals residing in every society who face difficulties when performing their regular activities. These difficulties may be illustrated in a variety of forms as physical challenges, developmental challenges, behavioral/emotional challenges, and sensory impairments, or also as a combination of them. The figure below displays the varying types of these "special needs" manifestations.

The goal of this paper is to discuss how design can be used to build environments, promote more meaningful experiences, and explore understanding the world for those with Autism. As

a consequence, emphasis on concerns about developmental and behavioral/emotional challenges. A substantial amount of study has been conducted on the implementation of interface standards for physical and sensory impairment. A limited review of the research was performed in the context of behavioral and developmental challenges.

As far as incorporation is concerned, a vast number of criteria will contribute to the acquisition of a universal style. The design and composition of the world in such a way that it can be accessed, interpreted, and exploited to the maximum degree possible by all users, irrespective of their skill. This study would take account of design considerations for Autism to respect criteria that may be applied to the evaluation of inclusive schools in Egypt without adversely influencing other pupils.

3.HIGH AND LOW FUNCTIONING OF AUTISM SPECTRUM DISORDER INDIVIDUALS

ASD is a brain development childhood disorder characterized by impaired social interaction, communication, restricted and repeated behavior that occurs before the age of three and can continue to persist for life. However, the degree of restrictions can differ depending on the standard of the functionality of the individual (i.e., lower or higher-functioning). High-functioning adolescents with Autism disabilities (those with higher IQ and milder symptoms) will be more able to cope with complex difficulties and resolve their impairment when the right environment is offered (DSM-5; American Psychiatric Association, 2013). There may be several extraordinary abilities and unique skills for high-functioning ASD individuals. For example, a child with ASD does not socialize but can memorize all bus routes with excellent precision by number and destination. Besides, there is a proof that savant abilities are more prominent in ASD than in the normal category. As a consequence, individuals with ASD are impaired in certain ways, whereas others may be intact or superior to others (Volker et al., 2010; Kanakri, 2012). On the other hand, low-functioning individuals may need intensive treatment and medical care throughout their lifetime. This dramatically restricts their capacity to function individually and makes it extremely challenging to build environments that accommodate them. While “supportive” settings for low-functioning individuals may still be developed, care-type environments would be very different than typical learning environments where individuals on the spectrum may communicate (Volker et al., 2010; Kanakri, 2012).

4.CONSTITUTIONAL EDUCATION RIGHTS FOR “SPECIAL NEEDS” CHILDREN IN EGYPT

The Egyptian constitution (2014) is the first Egyptian constitution to admit that individuals with atypical challenges are right holders. It is also the first Egyptian constitution to explicitly mention the rights of rehabilitation and inclusion of atypical children in the Child Legislation (No. 12/1996, as revised by Law No. 126/2008) as constitutional rights. to Article 80 of the Constitution:

“Every individual under the age of 18 shall be considered a child. Each child shall have the right to a name, identity document, free comp vaccine, health, and family or alternative care, basic nutrition, safe shelter, religious education, and emotional and cognitive development. The State shall guarantee the rights of children with disabilities and their inclusion within the society.”

Besides, a range of priorities has been established in the latest Egyptian National Strategic Plan for the Improvement of Pre-University Education (2014-2030) entitled "Together We Can." One of the key priorities of this initiative is to provide atypical learners with high-quality educational facilities that are equivalent to those offered for normal students and to ensure the integration of atypical learners with mild symptoms in all mainstream general education schools. It intends to prepare all new schools and 10% of the established ones for inclusion by the end of 2016.

In this respect, ministerial decisions (Nos 42/2015 & 264/2011) announcing implementing regulations established four groups that aim to be included in mainstream schools; learners with visual challenges – motor challenges – hearing challenges – intellectual development challenges; (mild intellectual challenges, slow learning, and high-functioning Autism). Through the enforcement of this integration program, the Ministry of Education has established such governmental schools. The National Authority for Education Quality Assurance and Accreditation (Law No. 82/2006) is also responsible for the assessment and quality assurance of educational institutions, for example, mainstream schools.

5. EGYPTIAN DESIGN CRITERIA FOR EVALUATING INCLUSIVE SCHOOLS

Unfortunately, limited statistics for ASD in Egypt are available, despite worldwide evidence of a rising prevalence of ASD (Alnemary et al., 2017). In previous research, the average rate of children with developmental disabilities in Egypt was 33.6 percent overall (Seif et al., 2008). While 800,000 citizens with ASD are expected in the Ministry of Social Solidarity (Ghada Wali, 2017).

The government of Egypt has been concentrating for a long time on special education, but ASD remains a significant priority in Egypt. It does not imply that there are no studies in such domain, but that there is little exposure to services that support individuals with Autism and their families, particularly government services. Other than the need to be located, Autistic individuals should be respected.

The criteria for a significant part of the decision (No. 264/2011) are one of the government's most important attention. Under this legislation, an inclusive design of the school shall have a room with suitable space for allocation of resources in an appropriate position to classrooms. It should be supplied with educational resources, psychological scales, and the appropriate reference materials for use by students. It is also necessary to provide adequate electricity and at least one computer with useful educational software for students.

Other guidelines for inclusive school construction include the installation of ramps and toilets for wheelchair users, furnished classrooms with suitable windows, boards, and electrical outlets, as possible as a well-equipped library, science and computer laboratories, and playgrounds. Finally, attention should be given to the illumination of both school spaces and pathways. The ministerial decision further provided for a ranking scale of three points (good, average, weak) for the evaluation of inclusion strategies under the former regulations.

As clarified, these regulations may be represented as offering general guidance for the inclusion of schools to address specific needs, which should be further expressed to include a more accurate and appropriate strategy for evaluating the equity of ASD vulnerabilities.

6. LITERATURE REVIEW FOR AUTISM FRIENDLY DESIGN GUIDELINES

A variety of debates on specific guidelines for the design of ASDs are conducted within the literary review. However, some literary architecture reviews include design criteria that do not depend on medical experience. The remainder of the literature review addressed observational findings and polls, including feedback from second-party participants, who primarily concentrated on the knowledge of those without Autism but who also interact with Autism (caregivers, teaching staff, family members, and medical professionals).

In the current literature, there are many gaps and many prospects for potential studies. The Autism-friendly architecture theory can be remembered to be an emerging research field at early growth stages. It should also be considered that the spectrum disorder is also a deficiency that it is challenging to validate and affirm specification requirements.

Although precious detail is available from these systematic reviews and can be considered as a base for further review, these reports show also that stronger, more pertinent research is required in order to analyze Autism-friendly settings, using the intersection of design features and elements of empirical studies to include a general framework of design guidelines for the ASD built environment.

Nine empirical research have undertaken Autism-friendly design guidelines (Richer & Nicoll, Whitehurst, Avarez & Crabtree, Humphreys, Magda Mostafa, Vogel, Khare & Mullick, Brand, and Mcallister & Maguire). It should be noted that in peer-reviewed scholarly journals four of the studies mentioned have been conducted (Richer & Nicoll, 1971: Alvarez & Crabtree, 2008: Mostafa, 2008, and Khare & Mullick, 2009). Other studies have been frequently linked to Autism design experience in this field (Whitehurst, 2006, 2007; Humphreys, 2008; Vogel, 2008; Brand, 2010; Mcallister & Maguire, 2012).

This research will illustrate the convergence of the design guidelines between peer-reviewed studies and suggest the possibility of a content disparities study that reviews the results of all nine papers in order to assess if the conclusions of these results vary substantially from those contained in empirical studies not included in peer-reviewed science journals. The staff of fewer than four is excluded.

6.1. Richer and Nicoll (1971)

Richer and Nicoll are known to be the founders of Autism-friendly design research. This research transfers children in two groups (ASD and non-ASD) to a new day-room environment where they spend their day learning and playing. Differences are found between the modified Autism-friendly environment and the original setting. At first sight, this seems to be an analysis of a strong empirical methodology – a competitor to Mostafa (2008). Two general Autism-friendly design strategies are provided: “the reduction of frustration and arousal” and “the reduction of flight behavior and facilitating approaches and rewarding social contact” (Richer & Nicoll, 1971).

The general validity of this analysis from more recent literature is one that confirms the nature of the thesis as being robust. Unfortunately, there are main "fatal" flaws that are necessary to invalidate Richer and Nicoll's findings. In particular, there are two main statistical flaws: first, children with multiple unexplained intellectual disorders form both the ASD and non-ASD categories, and it is not clear if there is substantial overlap in the nature of disability within the two groups. Secondly, it is still uncertain if children's behavior is triggered by a new atmosphere or by new personnel acts. In reality, the entire new world in which children interact, is introduced into being by a radically different attitude to pedagogy and the actions of staff. In the Richer and Nicoll study, a variety of alternate concepts emphasize that the conclusions drawn from the research may be inherently flawed.

RICHER AND NICOLL GOALS

1) REDUCE FRUSTRATION

SUBDIVIDE SPACE INTO SMALL AREAS

PROVIDE ACTIVE SPACES (CLIMBING, SLIDING, ROLLING)

TOYS FOR REPETITIVE MOVEMENT

2) REDUCTION OF FLIGHT BEHAVIORS

AREAS FOR TWO TYPES OF SOCIAL INTERACTION:

- CLOSE CONTACT AND ROUGH PLAY

- PHYSICAL BOUNDARIES FORCED SOCIAL INTERACTION.

6.2. Whitehurst (2006, 2007)

Two articles were written in 2006 and 2007 on a plan to construct a building developed as a residential area for 12 Autistic children (Whitehurst, 2006). The qualitative findings were focused on interviews with staff and relatives, which contrasted the children's reactions to the actual facility to the previous residential environment; they were also permitted to state which design factor-induced problems (Whitehurst, 2006). Whitehurst's Autism-friendly institution also enabled children with ASD to decorate their own homes; even choosing their paint colors, this could have increased the subjective sense of ease and control in one's surroundings (Whitehurst, 2006). In 2007, ASD children's opinions on the new building were published in a one-year follow-up report (Whitehurst, 2007).

WHITEHURST'S GUIDELINES

CURVILINEAR DESIGN

SPECIFIC COLORS

NOISE-REDUCTION FABRICS

NON-FLUORESCENT LIGHTING

SENSORY SUITE

COURTYARD AND OUTDOOR CANOPIES

SPECIFIC FLOOR COVERINGS

SPECIFIC BEDROOM DESIGN

UNDER-FLOOR HEATING

CIRCULATION SPACE

The project itself incorporates particular features in the building architecture (Whitehurst, 2006); these include curving design; special colors; noise-reduction material; avoiding fluorescent lighting; sensory room; indoor and outdoor canopies; specific flooring; special bedroom design; underfloor heating; and circulation area; (Whitehurst, 2007). These specific design aspects are supported by well-documented studies – Whitehurst maintains that these aspects have been shown to improve ASD well-being.

6.3. Alvarez and Crabtree (2008)

In response to the restricted evidence set by government guidelines in the United Kingdom Autism-friendly architecture, Alvarez and Crabtree (2008) describe the influence of varied living environments – from broad residential areas to small community dwellings – on the quality of life of ASD adults (QoL) (Alvarez & Crabtree, 2008).

ALVAREZ AND CRABTREE'S GUIDELINES

PREDICTABILITY AND CONSISTENCY

LOW STIMULATION

SAFETY

The findings revealed that QoL was higher in smaller community homes relative to those in large residential homes; QoL was defined as "life interactions, adaptive behavioral abilities and a degree of challenging behavior" (Alvarez & Crabtree, 2008).

The authors concluded that small residential areas have improved predictability and consistency, low stimulation levels, and enhanced employee support.

6.4. Humphreys (2008)

Humphreys is frequently quoted in the associated literature. Based on his encounter with an Autistic family member, Humphreys, who is an architect, defines "light, unexpected noise, heat" and "an engagement with details, sameness, stimulus, stability, and tranquility" (Humphreys, 2008) as significant environmental stimulus and consideration for individuals with ASD. The Humphreys indicated that "complexity can be stressful if it does not harmonize" (Humphreys, 2008). The architecture guidelines given are minimal detail and materials, scale, natural light, proxemics (e.g. private space), containment, observation, and sound quality. In this case, containment and observation refer to environments meant to be secure for children with ASD, which involve specifically defined containment and adult observation.

HUMPHREYS'S GUIDELINES

CLAM ORDER AND SIMPLICITY

MINIMAL DETAILS

PROPORTIONS

NATURAL LIGHT

PROXEMICS

CONTAINMENT

OBSERVATION

ACOUSTICS

To sum up, Humphreys offers a frequently cited paper that is not an analytical study, while the speaker references his participation in the workshop with ASD schoolchildren, who have been engaging in input on the Autism-friendliness of their educational setting. Humphreys is technically relevant as a theoretical framework for Autism-friendly architecture, but does not lay any substantive analytical or experimental foundation for his recommendations; rather, he uses particular architectural guidance as to the driving force behind his conceptualization of what constitutes an Autism-friendly environment. His paper exemplifies the gaps in the literature that prospective analysis can seek to fill with more systematic observational studies.

6.5. Magda Mostafa (2008)

Observational research and interviews were used to create the design guidelines. Interviews of second-party participants (individuals who have no Autism, but communicate with them). Observational surveys were performed on children with ASD in an educational environment. Her final result was a matrix of sensory architecture that balanced sensory disabilities with the architectural attributes of ASD individuals. Architectural attributes include illumination, acoustics, color, scale, and symmetry. The sensory problems addressed include visual, scent, Spatial, auditory, and symmetry.

MAGDA MOSTAFA'S DESIGN GUIDELINES

ACOUSTICS

SPATIAL SEQUENCING

ESCAPE SPACES

COMPARTMENTALIZATION

TRANSITION ZONES

SENSORY ZONING

SAFETY

6.6. Vogel (2008)

Vogel offers a unique viewpoint that it is one of the few works that directly encompasses the specific perceptions and insights of ASD individuals. Vogel defines "eight design principles and solutions" (Vogel, 2008) through conversations with parents, therapists, teachers, and ASD students. It means that these values may be applied, ultimately, in every interior space constructed for ASD individuals. These must be: "adaptable and flexible; safe; calm; predictable; easy to control; sensory-motor tuned; non-threatening; and non-institutional" (Vogel, 2008). Like several of the other ASD-specific principles found in scientific literature, these recommendations similarly resemble both the Universal Architecture Guidelines and the Zeisel et al. (1994; 2003) guidance regarding the usage of Alzheimer's disease patients in clinical settings.

VOGEL'S DESIGN GUIDELINES

FLEXIBLE

ADAPTABLE

NON-THREATENING

NON-DISTRACTING

PREDICTABLE

CONTROLLABLE

SENSORY MOTOR ATTUNED

SAFE AND NON-INSTITUTIONAL

Vogel's design recommendations put greater emphasis than mere theoretical or indirect reports on the demands of ASD individuals, due to the inclusion of people with ASD in their interviews, to collect their viewpoints specifically and to integrate those highly relevant perspectives.

6.7. Khare and Mullick (2009)

Khare and Mullick are involved in the principles of Universal Design and its association with the design of spaces for ASD people. The study includes an innovative approach to the issue and designs different methods for assessing Autism-friendly environments: 'Environmental assessment (EA) and performance measurement for children (PM), whereas the design parameter rating scale (DPRS) values the relevance of the environment for ASD children' (Khare & Mullick, 2009); the first of these methods, the EA, is a list of environmental characteristics for ASD children'. Like other similar studies, this is intended for learning environments and education programs for ASD children; unlike other Autism-friendly environmental studies, Khare and Mullick seek to build "three evaluation tools for assessing design parameters" (Khare & Mullick, 2009) for an Autism-friendly setting. The Eighteen environmental characteristics ('design parameters') referred to are: physical context, visual layout, visual guidance, social engagement, parent involvement, inclusion, future empowerment, supportive room requirements, space withdrawal, safety, recognition, accessibility, assistance, stability and maintenance, avoidance of sensory disruptions, sensory incorporation, flexibility and monitoring for evaluation and planning (Khare & Mullick, 2009).

KHARE AND MULLICK

PROVIDE PHYSICAL STRUCTURE

MAXIMIZE VISUAL STRUCTURE

PROVIDE VISUAL INSTRUCTIONS

OFFER OPPORTUNITIES FOR COMMUNITY PARTICIPATION

PRESENT OPPORTUNITIES FOR PARENT PARTICIPATION

PRESENT OPPORTUNITIES FOR INCLUSION

MAXIMIZE FUTURE INDEPENDENCE

OFFER GENEROUS SPACE STANDARDS

PROVIDE WITHDRAWAL SPACES

MAXIMIZE SAFETY

MAXIMIZE COMPREHENSION

MAXIMIZING ACCESSIBILITY

PROVIDE ASSISTANCE

MAXIMIZE DURABILITY AND MAINTENANCE

MINIMIZE SENSORY DISTRACTIONS

PROVIDE SENSORY INTEGRATION

PROVIDE FLEXIBILITY

PROVIDE MONITORING AND ASSESSMENT

EA and PM data were collected from 17 classrooms in 12 schools around the United States in a "naturalized setting that is familiar and enjoyable for children representing long-term performance instead of a one-time attempt by the therapist and teachers who know children and their behavior better" (Khare & Mullick, 2009); DPRS findings were "gathered from 20 experts dealing with intensely ASD children and even from 13 general education experts" (Khare & Mullick, 2009). In brief, EA and PM were observed by therapists and teachers, while DPRS was tested by specific experts outside the classroom setting. As the EA is provided in the context of an actual evaluation, there is an apparent normative argument that certain environmental characteristics illustrate what is deemed appropriate for an Autism-friendly environment, at least in the classroom environment.

6.8. Brand (2010)

In addition to the design recommendations for ASD schools, the United Kingdom has sponsored accommodation design studies for adults with ASD. Brands' 2010 research focuses on the usage of design to: "Reduce frustration and anxiety triggers by offering comprehensible, consistent spaces that meet the individual's sensory needs" (Brand, 2010).

BRAND'S GUIDELINES

SENSATION

PERCEPTION

REFUGE

EMPOWERMENT

Brand claimed that there are four forms of triggers that cause distress in individuals with ASD. He stated that comprehensive research is necessary because behavioral groupings have begun to emerge from the studies, but further study is needed.

It is important to prove their subjectivity. This is per Dr. Stephen M Shore's claim that when you encountered one individual with Autism, you saw one Autistic individual. It is important to keep in mind that each person may have a different reaction to the stimulus, and each ASD person will have a unique set of stimuli. That said, Brand suggested four forms of feedback through design triggers: "Sensation, Perception, Refuge and Empowerment" (Brand, 2010).

6.9. Mcallister and Maguire (2012)

Mcallister and Maguire aimed to establish a set of design guidelines for ASD-focused architecture. In specific, they focused on children with ASD in educational environments. To broaden the definition, they used the existing recommendations and their observations. The original guidelines were established by the Government of the United Kingdom in 2009. The UK Government Building Bulletin 102 outlines the standard design guidelines for people with ASD, stating: 'Simple layout: calm, ordered, low stimulation places, no confusing wide spaces; indirect lighting, no glare, subdued colors, strong acoustics, avoidance of sudden/background noise; durable materials, tamper-proof components, and hidden services: the probability of H&S [health and safety] danger assessment; (Mcallister et al, 2012)

MCALLISTER AND MAGUIRES GUIDELINES

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

CONCEALED SERVICES

POSSIBLY [HEALTH AND SAFETY]

RISK ASSESSMENTS SAFE INDOOR AND OUTDOOR PLACES FOR WITHDRAWAL

The UK Government is the first government to recognize the need to incorporate the ASD design guidelines into legislation. The details laid out in the Guidelines outline the elements to be considered in the classroom environment. These suggestions are aligned with past research, outlining elements such as colors, acoustics and noise, and areas to be alone.

After explaining the design guidelines set out in the literature review, the Venn diagram intersection logic will be expanded to execute Autism-friendly design features inside the built environment components (as described in the literature) in order to draw up a single list that this paper will use as a concrete proxy for a specific, fundamental Autism-friendly design

philosophy. The concept recommendations, which were fewer than four of the empiric literature, were refused.

7. COMMON DESIGN GUIDELINES SHARED BY EMPIRICAL STUDIES

	DESIGN GUIDELINES								
EMPIRIC LITERATURE	**Minimize Stimulation**	**Predictability and Consistency**	**Recalibration Space**	**Avoid Visual Stimulation**	**Proxemics**	**Avoid Glaring**	**Noise Avoidance**	**Subdued Colors**	**Safety**
Mcallister and Maguire (2012)	●	●	●	●	●	●	●	●	●
Brand (2010)	●		●	●			●		
Khare and Mullick (2009)	●	●	●		●				●
Alvarez and Crabtree (2008)	●	●							●
Humphreys (2008)	●	●	●		●	●	●		●
Magda Mostafa (2008)	●	●	●	●	●	●	●	●	●
Vogel (2008)	●	●	●	●		●	●	●	●
Whitehurst (2006, 2007)	●	●				●	●	●	●
Richer and Nicoll (1971)	●		●		●				●
	9:9 (100%)	7:9 (78%)	7:9 (78%)	4:9 (44%)	5:9 (56%)	5:9 (56%)	6:9 (67%)	4:9 (44%)	8:9 (89%)
PEER-REVIEWED RESEARCH	**Minimize Stimulation**	**Predictability and Consistency**	**Recalibration Space**	**Avoid Visual Stimulation**	**Proxemics**	**Avoid Glaring**	**Noise Avoidance**	**Subdued Colors**	**Safety**
Khare and Mullick (2009)	●	●	●		●				●
Alvarez and Crabtree (2008)	●	●							●
Magda Mostafa (2008)	●	●	●	●	●	●	●	●	●
Richer and Nicoll (1971)	●		●		●				●
	4:4 (100%)	3:4 (75%)	3:4 (75%)	1:4 (25%)	3:4 (75%)	1:4 (25%)	1:4 (25%)	1:4 (25%)	4:4 (100%)

Figure 3: Results of Venn diagram (Source: The Author)

Here are the findings of the intersection reasoning derivatives of the Venn diagram of the nine empiric studies. As mentioned above, these design guidelines, taken from the current literature review, are formulated in a single set to be referred to as the Autism-Friendly Design Guidelines. This set approximates the key point of view of the Autism-friendly design literature from which the assessment parameters can be formulated.

The nine architectural guidelines will be described below concerning their agreement between empiric studies and will be reported according to their percentages of agreement resulting from the peer-reviewed analysis in relation to all studies.

7.1. Minimize Stimulation

As a general term, “minimize stimulation” is an essential part of an Autism-friendly design. Such as lighting, dynamic types of intense visual stimulus, and unique color schemes. These parameters appear to be the most intuitive of all design guidelines provided by scientific literature; they are the only recommendations articulated in all nine reviews (100 percent agreement). The reported studies have earned 100% support for this guideline (4 out of 4 studies).

7.2. Safety

Safety is critical when designing for people with ASD due to the reality that those with Autism may have an altered understanding of their environment and may potentially be hurt by running through the walls and slipping down the stairs. Showers and toilet pipes can be hidden in such a manner that students cannot damage themselves, but the key idea is to be mindful of the

perception problem that could trigger injuries. This is the second requirement for "minimizing stimulation" in all design recommendations given by scientific literature; it is expressed in eight out of nine reviews (89 percent agreement). With reported studies, equivalent to "minimize stimulation," a 100% consensus has been achieved (4 out of 4 studies).

7.3. Predictability and Consistency

Seven of nine empiric research (78 percent) expressed the ability of ASD individuals to regulate their environment – by constructing an atmosphere that is predictable and self-consistent. This guideline was commonly characterized as a setting with no uncommon features, such as sudden corners or disruptive changes that disturbed their inclusion. Predictability and consistency appear to decrease dissatisfaction among ASD individuals. The published reports have a 75% agreement (3 of 4 studies) on predictability and consistency.

7.4. Recalibration Space

Recalibration space (sometimes referred to as "retreat room," "sensory room," "escape room" and "niche") is typically a small, enclosed area or separate places where an ASD student may withdraw from social contact to withstand a "meltdown." While retreat spaces are related to sensory cabins, they are referred to as low and high sensory rooms that manage ASD disabilities.

Seven out of nine empirical research utilized a kind of recalibration space as a design guideline for ASD individuals (78 percent agreement). Certain recalibration spaces (sensory rooms) are designed in such a way that the individual can directly monitor the stimulation inside the place. In the case of a recalibration space, the published studies have a 75% (3 out of 4 studies) agreement.

7.5. Proxemics

Many ASD people are particularly sensitive to getting too close to someone and their desire for extra personal space. In comparison, ASD individuals are less accepting of other behaviors that contribute to unwanted interactions with them. In certain research, proxemics have been suggested as large spaces or circulations. Five of the nine empiric research concluded that large spaces – which need to be carefully designed with a specific feature common to some individuals with ASD – are involved in the design of individuals with ASD (56 percent agreement). The peer-reviewed studies have achieved 75% approval (3 out of 4 studies) of proxemics.

7.6. Noise avoidance

Noise mitigation is an important aspect to avoid sound transmission to create a more welcoming environment that encourages calm, concentration and avoids behavioral outbursts for individuals with ASD. Just 67% (6 out of 9 studies) consent to noise avoidance. Acceptance of peer-reviewed studies is just 25%. (1 out of 4 studies). It could be that in Autism-friendly contexts, low noise levels are perceived to be implicitly included in the "minimize stimulation" state; therefore, there is a need for publications to become more precise in conceptualizing the definitions of statements, such as "minimize stimulation," that can be easily interpreted by readers to imply several things.

7.7. Avoid Glaring

Variation of light creates shadows and over stimulus, which can disrupt the focus of ASD individuals. Repeated shadows can contribute to glare that encourages irritation and disturbance; whereas fluorescent lamps are severely irritating to ASD individuals due to the flickering rate. Avoid glaring can be reflected in studies such as light diffusion, natural light, clerestory and avoid flickering. Convergence in just 56% (5 out of 9 empiric studies). Peer-reviewed studies have just 25% agreement to avoid glaring (1 out of 4 studies).

7.8. Avoid Visual Stimulation

Any unexpected visual stimulus can trigger obsessive reactions and distract concentration, especially in those with ASD. Architectural and interior attributes that are fascinating or architecturally entertaining for non-ASD individuals can be too unsettling for ASD people. More than half of the literature (4 percent out of 9) contains minimal visual stimulation, studies examined by peer reviews set a minimum agreement of 25 percent (1 out of 4 studies).

7.9. Subdued Colors

Study findings have shown that colors have an effect on a broad range of behaviors and that those colors are either calming or thrilling. These findings are often alluded to in Autism-friendly experiments to encourage the cautious usage of specific colors to better control the stimuli intensity in the design of people with ASD. Subtle and subdued colors can be considered for walls and floor finishing, strive not to use more than three colors, besides subduing the contrast between tones. Four out of nine systemic reviews (44 percent) stress the need for muted colors in the Autism-friendly design. Peer review studies have just 25% (1 out of 4 studies) of the usage of muted colors.

Differences have been reported between empirical studies. The only design suggestion that has been adopted with confidence by all studies and peer-reviewed research with 100% consensus is “minimize stimulation.” But the same criterion existed in peer-revised research followed by “Safety” (89 percent total) (100 percent). 78 percent of all studies and 75.0 percent for peer-reviewed studies were both “Predictability and consistency” and “Recalibration Space,” But within these four design features, there is an apparent pattern between peer-reviewed studies and further studies (Minimize Stimulation, Predictability and Consistency, Recalibration Space and Safety).

The agreement for both groups of studies was 56 percent for “Proxemics,” and 75 percent for peer-reviewed studies. The results for other design features are dramatically different from those of pairs, 67% are “Noise Avoidance” and 56% are “Avoid Glaring” and 44% for both “Avoid Visual Stimulation” and ‘Subdued Colors.’ Although the findings of s 56 percent, while the peer-reviewed studies agreed by 75 percent. “Avoid Visual Stimulation,” “Avoid Glaring,” “Noise Avoidance” and “Subdued Colors” only account for 25% of peer-reviewed studies which vary considerably from other studies.

These broad differences between groups are specifically linked to visual, sound, light, and color issues, all of which are known to be elements of “Minimize Stimulation.” Unless light, sound, and color are believed to be “Minimize Stimulation” elements, the formulation of phrases such

as “Minimize Stimulation” can often induce significant differences in the comprehension of literature.

After identifying the key recommendations accepted between research studies and reviewing their targets, the paper will evaluate below how the details gained from the previous studies can be applied to the school contents.

8. DISCUSSION AND ANALYSIS OF COMMON DESIGN GUIDELINES THROUGHOUT THE LITERATURE REVIEW

Based on the nine criteria from the Venn diagram, the criteria would be integrated into the research-based guidance from the literature review. Following the introduction of those concepts, an extensive list of school compounds (Layout, Classroom, Circulation Paths, Therapy Spaces, Multipurpose Space, Entrances, and Bathrooms) was required to promote the design of universal adaptable settings, as there is still a multitude of challenges for students. Therefore, as a designer, or architect who designs for individuals with ASD, it is necessary to recognize design considerations that satisfy their needs, while at the same time do not do any detrimental to other students.

Table 1, Analyzing common themes throughout the literature review

GUIDELINES	STRATEGIES	DESCRIPTIONS
Minimize Stimulation Strong regulation of all external stimuli is important in the learning environment for students with Autism. These include aspects of illumination (Mostafa, 2008, 2014; Beaver, 2006), acoustics (Mostafa, 2008, 2014; Beaver, 2006) and color use (Beaver, 2006; Whitehurst, 2006), smell, temperature, and	**Visual**	• The complexity and detail of design, materials, and patterns can create visual distractions (Humphreys, 2008).
	Sound	• Identifying and eliminating acoustical causes of distraction (Kanakri, et al., 2017; Mostafa, n.d.). • Including pink noise in spaces with different activities to maintain privacy (Sanchez et al., 2011). • Properly insulating rooms from exterior noise to minimize reverberation time (Mostafa, 2008, 2014). • Usage of soft materials to block sound in a room (Mostafa, 2008, 2014). • Plan spaces such that noisy areas are next to noisy areas and other silent areas are situated in quiet areas (Mostafa, 2014).
	Light	• Identification of soft windows that monitor illumination, help sound absorb, and reduce damage to mini-blinds when a student runs hand from top-down (Mostafa 2008, 2014; Warman 2019).

ventilation (Whitehurst, 2014; Clements and Zarkowska, 2000).		• Providing dimmer switches to permit lower light levels, limiting visual stimuli (Warman, 2019). • To provide a switch to enable students and teachers to monitor the intensity of light stimulus for each row of lights (Warman 2019). • Have versatile lighting options that facilitate the normal circadian cycle of the body (Shell, n.d.). • Use indirect lighting to reduce flickering, glare, and intensity (Gaines et al., 2016).
	Colors and Materials	• The use of low-saturation colors such as soft blues and greens (Shell, n.d., Paron-Wilds, n.d.). • The selection of natural materials and fabrics, e.g. cork, porcelain, rubber, and cotton (Kellert et al. 2008).
	Ventilation and Temperature	• Provision of temperature control, e.g. ceiling fans, operating windows, glass amount, sort of window treatment, heating system, etc. (Shell, n.d.). • Ensuring efficient air quality, e.g. sufficient ventilation, restricted indoor air pollutants such as cleaners, foods, furniture, electrical appliances, and humans (Paron-Wilds, n.d.).
Safety Since behavior can be unpredictable for people with ASD, a robust physical structure is desirable. few amounts of risk may be introduced into space thus removing the likely hazards (Shell, n.d.)	**Concealed Services**	• Limit proximity to the wires visually and physically (Kellert et al. 2008). • Supported unwanted electrical sockets enclosures (Warman, 2019). • Offer visual instruction on using electrical and mechanical functionality of the school (Shell, n.d.). • Hide bathroom pipes (Shell, n.d.).
	Robust materials	• Firmly anchoring large furniture (Shell, n.d.). • The use of durable furniture, finishes, and appliances (Mostafa, 2014). • Installing window sills at 13” D to keep students from causing head trauma to the windows or break the glass (Warman, 2019).
	Monitoring	• Mount mirrors securely to the walls to minimize damage by aggressive behaviors (Warman, 2019).

		• Providing a security system at the main keys of access to control who enters or exits (Warman, 2019). • Providing surveillance cameras and mirrors in the center to improve the safety of all students and teachers who use the space (Warman, 2019).
	Containment	• Defining clear boundaries around playgrounds or other outdoor areas, such as courtyards, to offer a sense of enclosure and security (Warman, 2019).
Predictability and Consistency Way-finding would be difficult if there are no visual indicators (e.g. landmarks) in the way to the destination and if those indications are visually isolated from each other (i.e. directly after accessing a cue A, one does not access a cue B) (Baumers and Heylighen, 2010).	**Navigation around central Area**	• Walk around space and one-way-finding (Humpherys, 2008).
	Spatial Sequence	• Design of environments that show concept and order, simplicity, protection, satisfaction, consistency and predictability (Ghazali, et al., 2018). • The division of rooms into separate tasks to further concentration and understanding (Mostafa, 2007; Stokes, 2001). • Design areas that eliminate distractions and clarify the function of each space (Stokes, 2001; Vogel, 2008). • Zone spaces of order, sequence, and daily routine (Mostafa, 2007). • Develop a technique for way-finding that utilizes landmarks, visual cues, and color-coding (Shell, n.d.).
	Visual Cues	• Provide visual guidance showing the sequence steps to be followed while performing tasks in each space (Vogel, 2008)
	Curved corners	• Curving walls when possible – to make them look ‘softer’ and to promote flowing (Humpherys, 2008)
Recalibration Space The decision of withdrawing from an active site helps in the promotion of	**Sensory Rooms**	• Children need access to adequate sensory stimuli and their bodies develop how to respond correctly to stimulation (Mostafa, 2008). • A period in a sensory room allows children to enhance their visual, hearing, and tactile processing, as much as developing fine and gross motor abilities (Mostafa, 2014).

humans over sensory stimulation and social experiences. Individuals with ASD typically need to resist and re-calibrate maladjusted sensory sensations in a private environment (Mostafa, 2008). Essentially, when over-stimulated or overwhelmed, it is a small partitioned space where a child may seek refuge.		• Swinging is one way to activate the vestibular system that processes motion and works with sensory control (Ghazali, et al., 2018). • A balancing beam is a perfectly simple piece for every sensory space (Ghazali, et al., 2018). • A sand or water table is useful for versatility an d ease of use and up. Beans, kinetic sand, rice, pasta, and shaving cream are enjoyable tactile mediums to discover (Ghazali, et al., 2018). • Jumping gives proprioceptive and vestibular feedback to individuals of all ages (Ghazali, et al., 2018).
	Escape Rooms	• Offer diverse ways for individuals to choose their degree of privacy and socialization (Rapoport, 1982). • Designing comfortable settings that enable a person to feel managed, create trust, and promote self-esteem (Gaines et al., 2016). • Providing exercise mats, which often supply individuals with an area to relax if required (Warman, 2019). • Offering constant motion swings that completely wrap around the user serve as areas of solitude and relaxation (Warman, 2019).
	Niches	• Promote socialization in small intimate areas for those who are overwhelmed in wide-open places (Humpherys, 2008).
	Buffer Zones	• Offer opportunities for previewing entrances, exiting and entire spaces for transparency across space to space, by scanning the atmosphere and maintaining their bearings as individuals adapt to a new setting (Gaines et al., 2016). • Including transfer nodes that facilitate social interactions and contact along pathways while transferring from one place to another (Gaines et al., 2016).
Proxemics Proxemics related to personal areas;	**Classroom**	• Offering a wide variety of electrical sockets in the building to satisfy the technical needs of all occupants, e.g. charge i-pads, etc. (Warman, 2019).

it is the space that people think they need to set it up between themselves and others, specifically for privacy. For individuals with ASD, the field of social relationships needs to be expanded, so in the design process, this can be taken into account to minimize any stress caused by a perception of risk (Humphreys, 2008). ASD people, however, are less respectful of the behavior of other people which leads to unwanted encounters with others (Mottron 2011).		• Offering furniture in the building that is portable and easily adjustable to allow students and teachers to tailor spaces to the needs. • Few numbers of fixed furniture can be used (Gaines et al., 2014; Sanchez et al., 2011; Shell, n.d.). • Provide small community spaces for socialization in a relaxed, supportive atmosphere (Gaines et al., 2016).
	Corridors	• Providing corridors of 6’ to offer extra personal space in public spaces (Gaines et al., 2016). • Multi-functional corridors can serve as active circulation areas with places for rest or informal interaction (Gaines et al. 2016). • Breaking the length of the circulation space visually to avoid user distress (Sanchez et al., 2011).
	Multipurpose space	• Provide enough space to promote effective socialization (Bourne, 2013).
	Toilets	• Provide ample area for aiding (Sanchez et al., 2011).

9. RESULTS: DESIGN CONSIDERATIONS FOR HIGH FUNCTIONING AUTISM BASED ON THEIR DEFICIENCIES

As previously explained, high functioning autism have developmental disorders and impairments that vary from physical disabilities, which could necessitate certain design considerations owing to their deficits. Autistic individuals have atypical brain architecture that allows them to perceive the world in an unusual way; their built environment has a profound effect on their behavior, communication abilities, and cognition. We can clarify these design considerations for high functioning autism according to deficiencies in the following points:

- They may have difficulty empathizing and respect others' desires that can be considered by design with **proxemics and recalibration spaces.**

- They may have social impairments that can be considered by design with **proxemics and recalibration spaces.**
- They may have no self-consciousness that can be considered by design with **predictability and consistency**.
- They may be unable to extract information from the context that can be considered by design with **predictability and consistency**.
- They may be unable to extract meaning from mental images that can be considered by design with **predictability and consistency.**
- They may be unable to extract meaning from sensory input that can be considered by design with **minimizing stimulation, and predictability and consistency.**
- They may be focus on details-driven that can be considered by design with **minimizing stimulation**.
- They may have difficulty in problem-solving that can be considered by design with **predictability and consistency.**
- They may have difficulty in adapting to change that can be considered by design with **recalibration spaces**.
- They may have difficulty concentrating that can be considered by design with **minimizing stimulation**.
- They may have difficulty in planning that can be considered by design with **predictability and consistency**.
- They may have difficulty in distinguishing stimuli that can be considered by design with **minimizing stimulation.**
- They may be overload by sensory stimulation that can be considered by design with **minimizing stimulation.**
- They may be withdrawn from social interaction that can be considered by design with **proxemics and recalibration spaces**.
- They may be outburst and overwhelming behavior that can be considered by design with **recalibration spaces**.
- They may be likes or dislikes intense stimuli that can be considered by design with **minimizing stimulation and recalibration spaces**.
- They may have a smaller size of the vermal area can promote excessive withdrawal from energetic play lead to problems with the musculoskeletal that can be considered by design with **safety, and predictability and consistency**.
- They may have impaired activation in previous frontal regions, brain areas linked to cognitive movement control that can be considered by design with **safety, and predictability and consistency**.
- They may have weakened immune defenses toward existing infections that can be considered by design with **safety**.

10. CONCLUSION: INTEGRATED METHODOLOGY FOR DESIGN AND EVALUATING AUTISTICS' INCLUSION SCHOOLS

Architects have been making a significant effort since the early 1990s to overcome the physical obstacles confronting people of public spaces. The emphasis should be expanded to discuss the sensory, behavioral/emotional, and developmental requirements for individuals with physical disabilities. Especially with individuals with Autism spectrum disorder, when the built environment has a direct influence on their communication skills and perception when the spectrum diagnosis grows, their needs become vital to handle.

The government of Egypt agreed to ensure the special needs of education rights and to establish integrated schools to fulfill the needs of all students (No. 264/2011). Egyptian government stated that an inclusive school architecture must be provided for in compliance with these regulations; to include:

Table 2, Ranking scale for the evaluation of governmental inclusion strategies

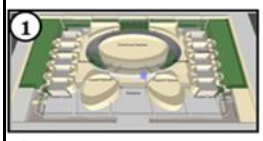
No.	FEATURES	Good (1)	Average (2)	Weak (3)
FIRST: RESOURCES ROOM				
1	A room with a convenient area for allocating resources.			
2	Appropriate location concerning classrooms.			
3	The appropriate area of resources room.			
4	Sufficient electricity outlets in resources room.			
5	Should be equipped with educational tools.			
6	Should be equipped with psychological scales.			
7	Should be equipped with a computer with helpful educational software for students.			
8	Provide necessary references for the use of teachers.			
9	Offer daily schedule in the resource room.			
10	Provide direct communication between resource room teacher and classroom teacher for following up students' needs.			
SECOND: SCHOOL BUILDING AND EQUIPMENT				
1	Affording ramps on the ground floor.			
2	Cleaned bathrooms designed for wheelchair users.			
3	Well-furnished classrooms with convenient windows.			
4	Provide enough seats for all students.			
5	Wide classrooms appropriate for several students.			
6	Unbroken classroom windows and suitable for use.			
7	Sufficient safety electrical outlets in classrooms.			
8	The lighting of all school spaces and corridors should be considered.			
9	Provide appropriate board in the classroom.			
10	Classroom floors are acceptable and undamaged.			
11	A well-equipped library is suitable for students.			

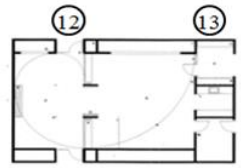
12	**Well-equipped science labs are suitable for students.**			
13	**Well-equipped computer labs are suitable for students.**			
14	**Well-equipped playgrounds suitable for students**			

In order to address the demands of individuals with Autism, as has already been shown, that is negligent by decision (No. 264/2011), an appraisal checklist has been drawn up to understand and adjust the diverse needs of individuals with Autism with the tools applicable to the evaluation of school components (Layout, Classroom, Active Circulation Paths, Therapy Spaces, Outdoor Spaces, Multipurpose Space, Entrances, and Bathrooms) which were given for a ranking scale of three points (good, average, weak) for the evaluation of inclusion strategies.

The Outcome serves to emphasize how architects and designers should expand research into the effects of spaces used by individuals with "special needs" to create adaptive, well-defined, safe, and efficient environments.

Table 3, Checklist for evaluating Autistics' inclusion schools

CHECKLIST FOR EVALUATING AUTISTICS' INCLUSION SCHOOLS					
GUIDELINES	**DESIGN STRATEGIES**		**Good**	**Average**	**Weak**
LAYOUT	**1. Configuration around Central Area with Window Wall and Screen Barrier**				
   	**2. Grouping spaces**	**Low stimulus: speech therapy, one-to-one instruction, and general classrooms.**			
		High stimulus: administration, gym, multipurpose spaces, music, art, crafts, and psychomotor therapy.			
	3. One Way Path.				
	4. Spatial Sequencing is simple and ordered.				
	5. Distinct Spaces Visually (Colour-Coded and Visual Cues).				
	6. Acoustical cushion rooms between classrooms.				
	7. Mirrored Distribution of classrooms.				
	8. Heavily exterior envelope to block noise.				
	9. Simple forms and simple building details.				

	10. Avoid complex shadow patterns.			
	11. Avoid flickering lights.			
CLASSROOM	12. A small gathering space is located before entering the room.			
  	13. Withdrawal space (located in the lowest stimulus area of the classroom)			
	14. A protected external courtyard has direct access to the classroom.			
	15. No thresholds exist at any doorway.			
	16. Lite window near the classroom door			
	17. Simple plan form			
	18. A large amount of moving and personal space			
	19. Enough space for extra staff.			
	20. Enough space for storage and removable panels.			
	21. Acoustical wall panels reduce sound external permeation and internal echoes.			
	22. Natural lighting (windows with above eye-level sills, clerestory, light shelves, or external solar control).			
	23. No Flickering lamps.			
	24. Configuration of the classroom according to schedule			
	25. A visual illustration of the planned activities inside and outside the classroom			
	26. Limited in detail, materials, and color.			
	27. Low partitions for tasks separation			
	28. Large amounts of storage (closed storage cupboards or open shelving with neutral boxes).			
	29. Low partitions for tasks separation			
	30. Many electrical outlets			
	31. Concealed electric and mechanical service			

CIRCULATION PATHS	**32. Simple, calm, and limited in detail**				
	**33. A large amount of moving and personal space**				
	34. Soothing movement				
	35. Visual wayfinding				
 	**36. Curving walls**				
	37. Natural light (skylight, clerestory)				
 	**38. Ceiling cavity**				
	39. Window seat				
	40. Niche				
THERAPY SPACES	**41. Occupational Therapy**	High-quality wall systems/soundproofed for insulation			
	42. Psychomotor Therapy	Natural and indirect light			
	43. Speech Therapy	Large amounts of storage			
OUTDOOR SPACES	**44. Small outdoor classroom**				
	**45. Large outdoor classroom**				
	46. Various shaded seating alcoves				
	47. Anchored furniture				
	48. Partial Height Wall with attached bench divide space				
	49. Safe external spaces for escape and retreat				
MULTIPURPOSE SPACE	**50. Versatile space provides various opportunities**				
	**51. High ceiling**				
	52. Acoustical wall panels				
	**53. Acoustical ceiling cavity**				
	54. Large amounts of space between benches				
	55. Permeable boundary				

ENTRANCE	56. **A simple enclosed entrance**			
				
BATHROOMS	57. **Wide space**			
	58. **Simple and clear**			
	59. **Touch-free sensor fittings**			
	60. **Hide bathroom pipes**			

11. RECOMMENDATIONS

Following the evaluation criteria for ministry decisions (No. 264/2011), it is clear that the interventions are targeted at the needs of physically disabled students and that the conditions for students with developmental disabilities ought to be investigated. The aim of this research was to deeper understand the needs of people with high functioning autism and how to respond to those challenges in a learning environment. It led to the implementation of a plan for amending legislation that considers the needs of people with Autism. Thus the research suggests the following:

- Architect's recommendation for the next step is to expand the former Egyptian legislation with standards for a broader range of universal conditions, which address various needs, mainly through active decision-making, including (1) general awareness of other related problems, (2) environmental features associated with sensory impairment, behavioral/emotional issues, and development, and (3) personal observation within facilities, (4) standard environmental criteria, including design options that emphasize control to establish meaningful environments within the facility, and (5) post-occupancy assessments.
- Educational institution's recommendation for raising awareness about different special needs issues in order to address more of their requirements (teachers, psychiatric, equipment, and furniture).
- Government's recommendation for creating a better universal atmosphere (i.e. inclusive, affordable, and accessible) in which people with varied abilities will fully realize their full potential as citizens, and those unable to contribute equally to society will be eager to participate.

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