CONTRIBUTION TO THE DEVELOPMENT OF INTERIOR SPACES IN HYPERACTIVITY AND DISTRACTED ATTENTION: AN ANALYTICAL CASE STUDY

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ABSTRACT

Attention deficit hyperactivity disorder (ADHD) comprises a deficit in behavioral inhibition, a condition affecting increasing numbers of people annually. The study of proper spaces, their design methodology, and adequate learning environments, especially in schools, for a particular class of people is required in developing a design methodology of spaces for children who suffer from hyperactivity and distracted attention by allocating proper design spaces that satisfy general and special considerations. However, this methodology depends on contributing to the development of different interior spaces for children with ADHD to achieve the same goals, that is, a rich opportunity to create sufficient spaces for such children. The aim of this study is to develop a design methodology that reflects the foundations and considerations of interior design in the context of the Saudi Code to design special places for people with special needs according to principles of sustainable material use.

Keywords: Interior Design, ADHD, Case Study.

INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is a neurological behavioral disorder that causes the evident dispersion of attention, reckless hyperactivity, or both (Wikipedia). This new disorder began to spread in the last decades of the last century. Treatment theory has come to be based on the concept of integration, which includes, according to Lintch et al. (1981), helping children with disabilities to live with ordinary children in regular classes, which has also become, in its modern concept, one of the most versatile and controversial
topics in special education. Scientific development has played a prominent role in the distinction between developed and developing countries on this subject. In developed countries, notably Italy, the United States, and Britain, such integration has been adopted on the basis of sound scientific planning and the strong support of many organizations, such as scientific institutions, the media, and research centers. However, in developing countries, some institutions have undertaken integration from a perspective of dependency, simulation, and attraction to the glamour of modernity, without proper planning, analytical studies, or community awareness. Moreover, integration has sometimes been adopted without the preparation of a professional team in charge of implementation or the participation of specialists, including interior designers, especially in a social climate dominated by negative trends and misconceptions about the capabilities of people with special needs.

**Hypothesis**

A key part of intrinsic architectural design and effective methodologies for the design of internal spaces and suitable environments, interior design involves the development of children and their interaction with the surrounding environment within the context of the Saudi code for the design of private enterprises (see Figure 1).

**OBJECTIVES**

- Develop a suitable methodology for the design of interior and external spaces for ADHD individuals, from pre-school age to adulthood.
- Design environments, especially environments for practical activities, that are suitable for the integration of children involved in the study with their normal peers.

**Role of architectural and interior design in response to children with ADHD**

ADHD is a complex disorder that affects sensory and communication. Architectural design is one of the key factors in addressing these situations. Architectural design can benefit humanity by achieving the following basic design criteria.

- Beauty: shape, joy, and simplicity.
- Materials and techniques: construction and power.
- Occupation: comfort, appropriateness, benefit, tranquility, and order.

**Simplicity in architectural design**

The complexity of interior or architectural design can create pressure for people with ADHD by steadily exacerbating their condition. A clear, simple design for classroom buildings facilitates their use by the occupants, maintains a psychology of movement, and allows time and effort to be expended in the space, an essential requirement in the treatment of people with special needs. Moreover, it helps to regulate the movement and control of ADHD children and promotes enjoyment of the location. Clear plans and organization of spaces certainly help to increase the efficiency and effectiveness of a building’s use regarding classroom location, services, and educational facilities, whether for integrated patients, students, or teachers.
**Natural lighting**

Natural lighting, which consists of forms characterized by force (LeCorbozih), is one of the important elements in achieving a location’s adequate lighting. Natural lighting in any building can raise morale (see Figure 2).

**Physiological and emotional emptiness**

The creation of adequate spaces to address the physiological and emotional situations of children under study is one of the measures of the success of a design and its lifetime. Every person has a personal sense of space and sometimes the size of a particular space or furniture arrangement is consistent with the person’s sense of what should have happened in this space. Everyone has a sense of an area known as one’s personal space or space bubble. This natural characteristic of humans and animals is referred to as a regional characteristic, a term drafted by Dr. Edward Hall.

Hall, a professor of anthropology, is widely credited with basic theories about human perceptions and the use of space, which varies between persons in particular groups and/or cultures. The space bubbles hidden in people are their defense or logical space. External forces, such as people, other things, and the middleware environment, can expand or shrink with space bubbles. In contrast, the invasion of a space can affect the “feelings” of people and their reactions to everything around them. Despite the fact that these spaces seem unnatural in its article, they are very real to each person. Designers work with normal spatial relations, but they must be aware of the impact of emotions on those spaces.

**Diversity**

The value of diversity in design is obvious in all facets of our natural and industrial environments. Designers use exciting things to capture attention due to their uniqueness or simply being different, creating excitement and interest in formulations that would otherwise be static and lackluster. As a basis of the design and an effective factor in the concept of unity, the designer must be skillful in dealing with diversity and other aesthetic foundations to the necessary extent and not exaggerate these elements, which would lead to negative and unattractive results. Thus, the integration of aesthetic, technical, and functional aspects in building design is an indicator of the success and achievement of their different desired goals.

A successful design for a space satisfies the needs of the present occupants and forms an appropriate context for those needs in the future. Actual success lies in the suitability of the design to potential changes in the needs of the people in the future. Since human needs are variable and diverse, this pushes the designer to design a variety of solutions based on relationships, standards, and rules in ways of collecting data and organization through analyses, installation, and evaluation to achieve a design that meets these changing needs and helps to regulate the interrelations of spaces.

The design of a space affects its constituent elements in terms of choice, quality, shape, and composition, such as the color, overall shape, size, sample furniture, general furniture, finishes, paint, level of security, and interior spaces and their relationship with external spaces.

The requirements for the application of these concepts to the design of educational centers for children with ADHD are shown in Figure 3.
Fig. 3: Requirements for the application of design to educational centers for children with ADHD

Communication

Any educational, residential, or entertainment space, among others, is a compromise in achieving communication between people and/or between people and the space. This connection can be achieved by knowing how, when, and where the connection is and its content. Answering these five questions (what, how, when, where, and what is the content) requires the ability to design good communication and achieve it in a building. This includes safety criteria to enrich communication with the children of the study and to achieve an educational environment similar to a residential environment. From this perspective, the design of this type of space is a future extension of residential design. Deviation from the circle of residential design formulations or in the shape of the building and the general organization of the rest of the spaces is not encouraged after an examination of the relationships between individual and collective communications and the organization as such.

Meaning

Meaning is the relative importance that arises between a space and its occupants. It can be expressed physically according to a person’s upbringing, environment, customs, traditions, values instilled since childhood, and other values that create people’s memory and that will still be present in the future. From this point of view, the success of the design of an internal space involves making it a suitable environment for the activities of daily life, in the
present and in the future, especially the meanings of the design of environmental, educational, and therapeutic spaces, aiming to document and preserve the meaning of concepts.

From this standpoint, the researcher will seek suggestions and recommendations as a result of the continuous and interrelated process of a set of actions that runs from the theoretical and intellectual bases relevant to the design process itself and the manner in which the research was conducted as a sample case study. Using scientific research methodology to learn about the various aspects of a design, the designer can discover new design concepts and develop an appropriate theoretical basis with which to address research proposals and achieve desired results (see Figure 4).

**Previous studies about integration**

One of the multiple studies that has dealt with integration is that of Zigler and Hambleton (1979), who aimed to study the effectiveness of a program for integrating children with simple mental disabilities into regular primary school. Two classes of children with mental disabilities were integrated through special classes attached to a regular school. The performance of normal and disabled children before and after the study was observed. The results referred to positive situations of the normal students interacting with the mentally disabled students as represented by the avoidance of verbal aggression. The results showed increasing growth in the social interaction of the mental disabled students, compared with children who did not participate in integration programs and remained in special daycare education centers.
Stephens and Braun (1980) aimed to measure the attitudes of teachers of regular classes toward disabled children. The sample consisted of 1430 teachers, male and female. The attitudes of the teachers of regular classes toward disabled children were determined according to a criterion composed of 20 clauses. The results indicated that 61% of the teachers were in favor of integrating children with simple mental disabilities into regular classes, while 39% rejected the idea. Stephens and Braun, among others, carried out studies of the effectiveness and success of such integration programs. They stated that the success of such programs for integrating children with simple disabilities depends on the capabilities of regular schools’ teachers to modify the means of their teaching so that they serve the needs of disabled children and that difficulties in doing so were the reason for the failure of such integration programs (Alrossan 1998).

With respect to the methodology of location integration therapy, integrating special classes within the regular school is one of the forms of academic integration, called location integration, in which abnormal students join normal students in the same school building but in special class units. Throughout the day, the abnormal students in the special class units participate in educational programs taught by special education teachers, as well as common educational programs with the normal students in regular classes according to a schedule so that the students can easily move to and from the special class units. This kind of integration aims at increasing opportunities for social and educational interaction between normal and abnormal students in the same school.

The therapy involved in mainstream integration means grouping abnormal students with normal ones in regular classes the entire time, in common educational programs, provided that the circumstances and factors that help achieve such integration are available. These circumstances and factors include the following:

- The acceptance of the abnormal students by the normal ones in regular class.
- Securing a special education teacher to work side by side with the regular teacher in regular class.
- Providing opportunities to deliver scientific material to the abnormal students and instituting procedures to secure success with an attitude that encourages overcoming the difficulties encountered by abnormal students in regular classes, such as negative social attitudes.
- Determination of conducting and correcting examinations.

Normalization integration is the integration of abnormal individuals with normal persons in occupation and housing. It is also called occupational integration and aims to provide proper opportunities for social interaction and for normal and abnormal individuals to have a normal social life together (Alrossan 1998). Comprehensive schools are known as schools that do not exclude anyone. Their concept is based on a philosophy of non-rejection, which means the non-exclusion of any child due to a disability. Studies in the above-mentioned areas have provided a suitable research background for the following sets of conclusions.

**Pros of integration**

1. With respect to school achievement, studies have proven that an integration policy has a positive impact on the achievement of children with simple disabilities (e.g., Cook et al. 1991; Alkhashrami 2002). Research results have indicated that students with
medium and severe disabilities can achieve better levels of education with general education (Halverson and Sailor 1990).

2. Studies have shown that the effective impact of integration in regular schools improves social and linguistic skills and the self-concept of children with special needs (e.g., Alkhashrami 2002).

3. Integration reduces social and psychological differences among children.

4. Integration helps children and their families overcome obstacles by positively modifying family and teachers’ attitudes and expectations.

5. Integration helps reduce the economic cost of an individual’s disability.

6. Integration can expand service bases, especially educational integration (Qamsh and Alsaida 2008).

Cons of integration

Ashley (1979) mentioned that, in spite of the advantages of integration, certain attitudes contradict the idea of integration and see it as potentially creating many educational problems, such as the following:

1. The problem of securing a special education specialist at a regular school. It is difficult to secure a special education teacher and the educational means for each category. Modern educational attitudes have begun to consider that each student or pupil in classes of the mandatory stage needs special education. This means that mandatory education has turned into special education in all its applications.

2. The problem of the acceptance of integration by regular school management and staff, as well as the students, since application of the integration principle leads to an increase of the gap between normal and abnormal students in terms of the acceptance and cooperation with the latter, as well as an increase in mocking behaviors, such that the negligence of abnormal students increases.

3. The problem of delivering class subject matter to abnormal students due to the difficulty in finding assistant teachers.

4. The problem of preparing individual educational plans for abnormal students, which means a lack of individualized interest in the children joining the integration program.

5. The problem of increased social isolation among normal and abnormal students in integration programs, especially when the circumstances of the abnormal students do not allow them to participate in various social, sport, and technical school activities and other activities, increasing their psychological frustration (Alrossan 1998).

International experiments in the field of integration

1. Integration experiment in the United States

The United States is one of the leading countries in the application of integration ideas of various forms, especially since the emergence of public law No. 142/94, known as the education law. Rasso (1974) referred to a new type of student joining regular schools as result of the application of the aforementioned law: In the state of Pennsylvania and based on court rule, all disabled children should be taught in regular schools. In the District of Colombia, application of this integration allowed the provision of educational opportunities for disabled children. However, 50% of them do not receive suitable education, since integration has provided a chance for education for 3.5 million disabled children but there are 7 million disabled children in the United States.
2. Integration experiment in Britain

Interest in the idea of integration in Britain began in the 1970s, when people with special needs were taken into consideration in planning educational programs. In light of this, the British government requested that Mary Warnock (1974) be president of a committee aimed at studying the situations of people with disabilities in Britain, Scotland, and Wales. This committee's objective was to study the status of private schools and increase the lifespan of individuals in private school until the age of 19, as well as study resource centers, early education, and the measurement, assessment, and training of teachers. These interests were outlined in the Warnock report published in 1978 and its contents adopted by the British government. Based on this series of events, a law on special education in Britain was instituted in 1981 that recognized the term *children with special needs* instead of *disabled children*.

3. Integration experiment in China

China has applied the idea of academic integration and social integration by integrating mentally and physically disabled children, with students with simple and medium mental disabilities joining primary school classes. Mentally and physically disabled children are integrated in schools where they are provided suitable facilities. The idea of social integration has been applied to the areas of housing and occupation for the mentally disabled, where such individuals live with their normal neighbors in the same housing areas and carry out agricultural activities daily after vocational training (Alrossan 1998).

4. Integration experiment in the Kingdom of Saudi Arabia

The Ministry of Education of Saudi Arabia undertook application of Articles 54–57 of the education policy, which states that the education of superiors and the disabled is an integral part of the country’s educational system. Due to the Ministry of Education’s belief in the importance of integration as a leading step in the education of children with special needs and because the percentage of these children is not less than 20% of the students of regular schools, the education strategy has involved activating the role of regular schools in the field of educating children with special needs, through the following procedures.

- The continuous expansion of the creation of programs with classes of the following two types, attached to regular schools:
  a) Classes to which the curricula of special education institutions are applied, such as classes for children who are mentally capable of learning and classes for deaf children.
  b) Classes to which the curricula of regular schools are applied, such as classes for children with impaired hearing.

- Employing and benefiting from modern educational means, such as the use of programs of resources rooms, wandering learning programs, teacher advisor programs, and programs of observation in special education, to activate the role of these institutions as training centers through which specialized training courses are held for teachers, educational supervisors, and administrators on the job (Kawafha et al. 2007).
Case study

**Evaluation:** The general concept of evaluation is to seek to provide a certain idea, design project, or specific opinion to the best, including diagnosis of the problems that lie ahead or appear in architectural designs, to eliminate, repair, or avoid their occurrence in the designs, as well as determine positive features and advantages in the subject case so that it is promoted and one can invest in the development of the proposed designs.

**Criteria of the proposed designs**

- Evaluation of functional, aesthetic, and technical aspects.
- Evaluation of the part to be evaluated only.
- Correlation of the evaluative criteria and achievement of the following:
  - Tutorial and educational program and its objectives.
  - Therapeutic program.
  - Studies of the building and its relations with its surroundings and neighboring environment.
  - The layout and concept.
  - The educational elements (organization of spaces and their interrelations).
  - Systems of internal and external movement.
  - Interfaces and method of their treatment and impact on neighboring spaces.
  - Interaction between the outside and inside (external spaces and intercom).
  - Design elements and vocabularies used.
  - Execution economics.
  - Potential to modularize and change the building and its future expansion.

The criticism uses a system of an assemblage of elements, since the criticism or case study is carried out according to the building’s study in terms of design, environmental and behavioral compatibility, formal and general planning aspects, and correlations between these elements.

Study of Saudi code, achievement of right metrics, global code, theories, global applications, and deriving the following from them:

- Standards and criteria for the spaces of the study building and overall building.
- Standards of internal and external spaces and intercom.
- The aesthetic standards of the interfaces.
- Determination of the concepts of harmonization, contrast, and similarity.
- Description of the impact of the social, economic, political, and technical changes on the architectural outcome, as well as the derivation of concepts and principles that comprise modern thought and the contribution of solutions, suggestions, and research recommendations.

**Analytic study for the floor plan of a school in Newcastle**

The idea was to divide the school into junior, senior, and main community departments and the administration. The classes of each school are composed of a yard limited by a golden spiral to provide a suitable design focus and meeting point when using
the building or traveling between classrooms, facilitating movement and linking classrooms by a line. This design contributes to determining one’s location easily at any moment inside the building, thus providing a source of optical communication so that children can feel secure. This design also allows for their observation so that their behavior can be modified and one can more readily participate in their cure (see Figure 5).

It is noted that the survival of the place for more than 800 years is the best example of the importance of the simplicity of its design, its sustainability, the good relations between the space and the surrounding environment, the strength of the design to keep the building organized, securing a safe and stable environment, especially one in which the control and observation of children with special needs and the reduction of disorder are the main concepts of their education and that of individuals with special needs in general (Gherandian).

Fig. 5: Floor plan of a school for ADHD students in Newcastle

**Unity through the use of finish materials**

The treatment of ADHD requires the avoidance of stimuli and distractions to increase concentration. The correlation between the design of ceilings, walls, and floors that contribute in the formation of a space has great impact on the treatment of ADHD children. The achievement of a unity is therefore encouraged, through the use of finish materials, covering the roofs of the same color as the walls and floors, and with the same lines, durability, degree of isolation, and extent of sound absorption (see Figure 6).
Design simplicity

By studying the design of the walls, it is clear that these limit the details around the window that help to organize and reduce shadows and provide a calming impact on the sections of the room. It is clear that the wall end is free of lines, another example of simplicity in coverage and self-control concerning the convergence of vertical lines with horizontal ones in the space. Gradation and simplicity of line and color assist in maintaining shape and function. Interestingly, such design simplicity contributes to providing security and revives wide spaces with highly technical details and bold lines through the use of linear relations and color gradation in the space to reduce visual stimulation and environmental impact. Simple color gradations linking the wall, floor, and ceiling assist in the stimulation of self-control and provide a greater sense of calm in the space, as well as facilitate concentration and eliminate distractions.

Accessories are used simply for occupational aspects and seldom for aesthetics. The use of door handles, high electrical switches, and in-floor heating assist in providing a sense of calm and a comprehensive system.

Case study

The human development center in Riyadh is prepared for the diagnosis and treatment of ADHD children (see Figure 7). It begins with an initial investigation of the child’s case and diagnosis through five days of observation for four hours daily, followed by an appointment with a specialized physician. The appointment is carried out after the family has filled out a questionnaire during the initial investigation, including very specialized questions about events from the child’s birth to the date of filling out the form. The questions are divided into various sections and measure psychological, social, and spatial aspects, as well as symptoms. During the appointment with the family, the treating physician presents the child’s condition and diagnosis, as well as the results of the observation and questionnaire to determine the child’s educational and spatial needs and the family’s education.
An analysis of the school’s design as described in Figure 8 indicates the following: An emphasis on the bright colors in the wall covering assists in concentration and self-control. The diagnosis is made by special means, such as by using colored lines on the floor to recognize the extent of a child’s ability to trace the line and to measure the concentration ratio, among other aspects. Ceramics are deemed a basic option in terms of health: It shows dirt quickly, is easy to clean, and is economical in terms of cost. In addition, while ceramic floors are not suitable or safe for dropping on, they are a source of noise, since they reflect children’s sounds, especially when there is no furniture.

Therapeutic classes are located on the upper floor, since the floors are covered with wood. The classrooms contain boxes for satchels and book bags appropriate to the sizes and ages of the children. Lines on the floor are used as criteria in the children’s education, diagnosis, and treatment. Individual education is provided for the treatment of ADHD. Computers and specialized software are used in addition to special devices for the individual treatment of attention deficit disorder. The walls of the hallways between classrooms show...
the weekly schedule, with educational labels. In addition, one classroom uses only industrial lighting, with a dark cover over its windows (see Figure 9).

![Fig. 9: The details of different classrooms in the case study.](image)

**Stairs and vertical modes of communication**
Spiral stairs and unsafe railings are adorned with decorative designs but do not meet the needs of the subject children. A fire box is a barrier against passage and movement.

**A place of education through entertainment (grand theater)**
The grand theater has the biggest space. There are various drawings of mixed colors on the walls that are deemed a barrier to concentration. This may be attention getting and a way to measure distraction. The dark wooden floor is a good choice that is used for storage when the stairs are not in use (see Figure 10).

![Fig. 10: Different details of different spaces in the case study.](image)

**Play and entertainment**
The building was originally designed as an apartment building but was converted to a specialized center lacking an outdoor space. To resolve this issue, the roof was converted to a play area closed off by umbrellas. The ventilation uses an air intake device and a cooling device. Despite various efforts, the design remained poor in terms of ventilation and location. It is an unhealthy, unsafe, and polluted location that constitutes a danger for children (see Figure 11).
Quality School

Quality School is a specialized school associated with the human development center. The children are referred for study in this school after diagnosis and treatment at the center, under the supervision of a specialized physician. The primary classrooms are for boys and other schools are for girls. The school accommodates all grades (see Figure 12). The school is under the supervision of the Ministry of Education of Saudi Arabia. It teaches the same curricula to all the children, using suitable educational methods with the help of educators specialized in learning difficulties, including ADHD. The maximum number of students in each class is five. The classrooms were designed for small classes and contain another classroom for individual instruction, to increase concentration, and for education by specialized teachers to adjust, treat, and modify student behavior.
Individual classes and the common door with the main class

Main class: The classrooms were designed as small spaces, ranging between 20 square meters and 25 square meters. The walls are painted with a single bright color gradated between cyan and white. The classroom contains only one panel and is free from any panels that are classified as inducing attention deficit. Specialized computers and software are used and there is a space for this. The stairs were designed in a simple and practical way and the bathrooms are small and close to the classrooms.

The courtyard: The school is surrounded by walls or fencing. The delivery location of the children and the gates were designed as part of the place for securing the control of children’s movement and to maintain external contact with the surrounding areas and neighborhood. The sports activity area was designed to ensure safety and containment (see Figure 13).

RECOMMENDATIONS

First: The provision of special education services to abnormal children who join regular schools and benefit from its educational services, such as talent class, including children with learning difficulties, physically disabled children, visually impaired children, and children with communication disorders.

Second: The provision of special education services in regular schools for some classes that are learning traditionally in special educational institutions or programs in classrooms attached to regular schools, such as for visually or hearing impaired children.

Third: Expansion of the scope of the role of special education institutions under the Ministry of Education in undertaking additional future roles and tasks, such as the following:

- The introduction of specialized programs in these institutions to care for and educate children with multiple disabilities and other children who are difficult for regular schools to accommodate.
- The addition of new tasks for these institutions to become information centers and support services that provide special education programs in regular schools, with experiments, information, means, materials, and educational means to enable these programs to perform their roles in the best manner possible.
REFERENCES FOR FURTHER READING


SCIENTIFIC REFERENCES

[5] Alkhashrami, Sahar Ahmed, Integration of children with special needs in the regular schools, survey study of the integration programs in Kingdom of Saudi Arabia, acceptable research for publication in magazine of King Saud University, 2002.
[12] www.auctores.be/../UDDA%2003102008%205%20Humphreys.pdfautismandarchitecture