Achievement to Environmental Components of Educational Spaces for Iranian Trainable Children with Intellectual Disability

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Abstract

Intellectually disabled children differ from other children in terms of physical, rational and behavioural aspects. The present research is aimed at identifying and reviewing the factors that improve their relationship with the surrounding environment in educational areas. The research method of this study was a survey that contained both qualitative and quantitative sections. The qualitative section involved the practical participation of intellectually disabled children and was implemented by drawing pictures. The quantitative section involved the use of a questionnaire. The findings show that factors like colours and proportions have a tangible effect on educational spaces at the level of education.

1. Introduction

The human is an organism that always tries to establish a relationship with his/her surrounding environment and to cause change and transformation in it, also to meeting his/her requirements. Hence, humans may be affected typically by the environmental conditions and on the other hand with respect to his/her needs, values and objectives, s/he changes the environment. As the environment forms and restricts the activities of users, it seems necessary to ensure appropriate planning to achieve the maximum efficiency and growth. But there is a certain group of humans,
known as intellectually disabled children. They differ tangibly from the other children of the same age in terms of intellectual, physical, behavioural and personality traits, they are considered to be Exceptional persons and constitute 13% of members of community in various countries.

These small humans suffer from several disabilities such learning, intellectual disability, emotional dysphoria, kinetic-physical disability and visual and audio impairments. It is important that they have special environments for education that not only can meet their special requirements, but also can be adapted to their emotional and mental characteristics and will provide the conditions in such a way that their interaction with the environment and surrounding world will occur more easily and therefore they will more easily be able to reach their maximum human potential.

The present study is intended to identify and examine the elements, which upgrade the quality of the educational environment for intellectually disabled children and prepare the needed platform for their appropriate relationship with individuals and the surrounding environment. Thus, one can improve their intellectual and social growth by the aid of deeper recognition of intellectually disabled children in terms of psychological and personality aspects and by creating special environments for them whereby they can utilise their maximum capacity and potential. It seems some factors such as light, types of materials, sound, colour and proportion may have an effect on the quality of the educational environment and cause enhancement to educational levels.

2. Literature review

In this section, we deal with findings and research, which have been carried out by psychologists and theorists of Exceptional children and on the other hand by architects and setting-designers regarding the field of intellectually disabled children.

2.1. Psychology of children with intellectual disability

2.1.1. The role of educational games in conveying information to disabled children

During the 1960s, training games have drawn special attention by many educational leaders and most researchers who reviewed and analysed the use of educational games in the classroom declared that games act strongly in conveying the concepts in learning environments and the element of participatory learning should be embedded into an empirical game to produce a different learning environment that can include competition, curiosity and creativity (Burenheide, 2006). Game therapy and puppet shows may improve the process of adaptation to the group and community in intellectually and/or physically disabled children (Carmichael, 1993). Hence, this issue is considered as a determining factor for the design of learning environments for trainable intellectually disabled children.

2.1.2. Art and art therapy

The researchers have shown that art therapy is also employed in various forms such as painting therapy, drama therapy, puppet shows, cinema (movie) therapy, music therapy and rhythmic moves for treatment and control of aggression (Crimmens, 2006). Art-therapists assume the art process is very efficient in the contribution to the appropriate growth of intellectually disabled children communications and reducing their aggressive moods (Kaplan, 2007). In addition to increasing power of perception and recognition by the aid of painting in intellectually disabled children, this conceptual art can increase their learning in some skills such as reading, writing and arithmetic (Case & Dalley 2008). Painting is assumed to be one of the paramount means of expression of intentions, thoughts, ideas and internal requirements of humans. One can discover appropriate information about personality traits, mental capabilities, emotional characteristics, failures, stresses and internal desires in paintings drawn by children. Similarly, this method was used to discover environmental concerns and requirements of intellectually disabled children in this article.

Majorek et al. (2004) examined the effect of exercise along with music on five children with Attention Deficit/ Hyperactivity Disorder (ADHD). The results of this investigation showed that the exercise along with music might have a positive effect on problems of social behaviour and work speed in these children. Moreover, in healthcare environments, Bishop (2012) claimed that art plays a key role in a paediatric healthcare environment from a child and youth perspective.
2.2. Environmental impacts

Much research has been carried out in the fields of (disabled) children, environment and educational spaces. Abbas (2012) argues for the importance of children, youth and their relationship to environments in developing countries. He also carried out research on Healthcare (Abbas & Ghazali, 2010) and on Early Childhood Education (Abbas, et al., 2010) in Malaysia regarding post-occupancy evaluation studies. Allen S. Abend (2001) claims that students with attention deficit disorder and emotional problems often need physical isolation and acoustic spaces in order to reduce absent-mindedness and inattention during activities and that classrooms should be considered as specific individual spaces to meet their requirements. He also believes that educational settings should have the least limitations. Likewise, hyperactive children like the excitement since they do not enjoy quiet or peaceful activities. This group focuses well on highly attractive activities. The current classrooms are not attractive for them (Linda Sunna, 2009: 43, 100). A group of environmental factors such as colours, variation, brightness, reality, stimulation of imagination, comfort, freedom, dynamism, flexibility and environmental warmth, etc. may have an effect on the minds of these children.

In the field of interior design, Noiprawat & Sahachaisaree (2012) argue that proper environment modelling could be useful as a part of special educational programs designed to extenuate behavioral and emotional disorders, and to improve social skills. Ramli et al. (2013) investigated classroom users’ perception based on a questionnaire survey and claimed that changes in the classroom environment need to be implemented. On the other hand, ensuring the existence of a secure environment is necessary for all of the people with mental retardation (Lacason et al., 2001: 104). Therefore, conscious change and transformation of settings may lead to their mental and behavioural growth and development.

2.2.1. Open spaces for children with intellectual disability

Aziz and Said (2012) discussed the impact of outdoor places on children. They believe that the children’s favourite places and outdoor playing behaviours are affected by their requirements, both physical and social factors. Also, in another paper regarding children and outdoor spaces, Azlina & Zulkiflee (2012) believe that landscape and environmental features influence children’s physical activities. In a combinatory research approach, Sahimi (2012) extracted preschool children’s preferences for their school environment by taking photographs and analysing them.

In another study about children, Corraliza et al (2012) argue that nature boosts children’s pliability so that those children who had more contact with nature cope better with adversity than those who do not have daily connections with the outdoor environment. Likewise, improvement in quality of these spaces may act efficiently in health and growth of physical powers, enhancement of social interactions and group correlation, and even mental training and growth of intellectually disabled children.

With respect to many of the studies that have been carried out regarding intellectually disabled children, it has been demonstrated that this group of children are special, extremely vulnerable and different from other children and it is felt that they require special attention. They need special facilities, environment, and behaviour in the home, school, and social settings.

3. Methodology

3.1. Sampling

In this study, the statistical population includes all trainable intellectually disabled students from the fourth, fifth, and sixth grades, in Rasht city, in the centre of Guilan province (one of the northern provinces of Iran) who studied in academic year 2012-13. Similarly, the studied sample comprises of 45 primary school students in the fourth, fifth, and sixth grades, who have studied in Khazaeli Primary School at Rasht City and they were selected by means of the classified sampling technique. This group of (trainable) intellectually disabled students had an Intelligence Quotient (IQ) of 50-70 and they constitute about 70-80% of the intellectually disabled population. Likewise, most of them had multiple disabilities and also with other traumas like disabilities in their vision or hearing, and the Attention Deficit Hyper Activity Disorder (ADHD). It should be noted that there are seven schools specific for intellectually disabled children in Rasht City, which are similar to each other in terms of environmental and educational quality.
For this reason, Khazaeli Exceptional Children School was randomly selected as the sample. As mentioned before, the present research was conducted in two sections, a quantitative and a qualitative section through the survey method:

3.2. Quantitative section

With respect to the previous studies and research, whether, in the field of Psychology of Exceptional children or the area of environmental studies, several factors were identified regarding the educational settings for intellectually disabled children. Accordingly, a questionnaire was formulated by aiming at the evaluation and measurement of the rate of effect of these factors (light, kind of materials, sound, colours, and proportions) and by means of images and graphical figures under the supervision of a psychologist of Exceptional children. This was attempted with the cooperation and coordination of school principal and teachers in order to prepare the ground for better implementation of the test since carrying out a study on this group of children is a time-consuming task, it requires a lot of energies and can cause delays in the study timetable.

The results derived from this section were evaluated and validated with the help of Chi-Square and alpha coefficient test via SPSS statistical software in both descriptive and inferential parts. It requires noting that the prepared questionnaire was reviewed by the relevant experts and teachers and the content validity of the questionnaire was confirmed.

3.3. Qualitative section

This section was implemented by aiming at identifying and reviewing the mental concerns and environmental requirements for intellectually disabled children regarding educational settings. In this regard, under the supervision of a psychologist, they were asked to draw a picture of their favourable school. Then, these paintings drawn by the children were analysed by a psychology specialist of Exceptional children from a psychological perspective and at the same time from an architectural view. It should be explained that the interaction was established in such a way that the intellectually disabled child was able to act freely because of the creation of a peaceful and friendly environment throughout the research process.

4. Findings

4.1. Findings in the quantitative section

In order to analyse the data on favourable educational environments for intellectually disabled children, descriptive statistics was used, and inferential statistics was examined.

4.1.1. Descriptive statistics

Over two-thirds of respondents (71%) selected vacant and 29% of them selected crowded in response to the question: “What type of classroom would you like to have?” Thus, focusing in classrooms of intellectually disabled children is crucially important since the most basic problem of this group of disabled students is latent in learning and lack of mental focus and, therefore, special attention should be paid to this subject in the design of educational settings. It should also be taken into account that Sona (2009) highlights that children with hyperactivity symptoms never enjoy quiet or peaceful activities and they prefer to be involved with highly attractive activities to strengthen their concentration.

As seen in Table (1), according to the question that was asked of intellectually disabled students about interesting places for intellectually disabled children in school settings, the majority of children (56%) selected the school yard. In this regard, Aziz and Said (2012) and Alzina and Zulkiflee (2012) found in their investigations that the presence in outdoor environments might lead to social and physical growth in intellectually disabled children. Also, according to findings of psychologists of Exceptional children, some activities like games and rhythmic sports may play a very
effective role in social and behavioural growth in intellectually disabled children and like the results of this question, these activities may be carried out in open spaces at school.

### Table 1. Spaces distribution frequency.

| Spaces       | Quantity | Percent |
|--------------|----------|---------|
| Staircase    | 0        | 0%      |
| Classroom    | 16       | 35.6%   |
| Yard         | 25       | 55.5%   |
| Computer hall| 4        | 8.9%    |
| Total        | 45       | 100%    |

Sources: Authors

The majority of respondents (70%) in giving answer to this question that “Which one of the following figures would you like your school to be similar to?” selected Fig (a) that was with the normal lines and circular form and 30% of them chose figure (b) with cursive lines. The results indicate that intellectually-disabled children may respond better in comprehension and recognition of curved shapes and normal lines. It is easier for them to comprehend such shapes and their mind is less challenged.

With respect to Table (2), nearly half the respondents (48.9%) of selected the choice ‘glazed’ in response the question: “Of what kind of material would you like the frontage wall of school to be made?” According to the conducted research by psychologists of children, this group of children suffers from several symptoms like anxiety, autism and dysphoria so that it seems that using some materials like glass and wood in educational spaces may encourage peace for them.

### Table 2. Choices distribution frequency.

| Materials | Quantity | Percent |
|-----------|----------|---------|
| Brick     | 14       | 31.15%  |
| Glazed    | 22       | 48.9%   |
| Wooden    | 6        | 13.3%   |
| Stony     | 3        | 6.7%    |
| Total     | 45       | 100%    |

Sources: Authors

### 4.1.2. Inferential statistics:

As observed in Table (3), there is a significant relationship (0.013 < 0.05) among the selection of type of geometrical figures (square, circle, quadrangle, and triangle) and architectural line kind (curved, cursive).

### Table 3. Inferential analysis- significance level (0.013 < 0.05).

| Cases       | Fig B (curved lines) | Fig A (cursive lines) | Total |
|-------------|----------------------|-----------------------|-------|
| Quadrangle  | 10                   | 50                    | 13    | 29.5 |
| Triangle    | 0                    | 0                     | 6     | 13.6 |
| Circle      | 7                    | 35                    | 12    | 43.2 |
| Square      | 3                    | 15                    | 3     | 12.5 |

\[ x^2=10.811 \quad \text{Sig}=0.0133\quad \text{DF}=6 \]

Sources: Authors
It means that the minds of intellectual disabled children are consistent with each other in perception some of the architectural forms and surfaces and they showed more inclination to curved shapes. Autism and lack of relationship among them with their surrounding milieu is one of the most prevalent existing signs in various types of intellectually disabled children, some of whom are affected by space form and formative structure of settings. The reaction, which was shown by them regarding curved, gentle, and peaceful shapes whether in section of architectural images and or in part of geometrical figures and the relationship between both of them may substantially influence the architectural design of educational facilities.

At the same time, in another section, the relationship between symptoms and type of disability in intellectually disabled children and the question: “Of what kind of materials would you like the frontage wall of school to be made?” was evaluated where the result indicated that there is no significant relationship between both of them.

With respect to Table (4), it seems in general that there is a significant relationship between the type of disability in the tested children and selection of colour of school wall (0.001 < 0.05).

| Type of disability          | Pink | Gray | Yellow | Green | Orange | Red | Blue | White | Total |
|-----------------------------|------|------|--------|-------|--------|-----|------|-------|-------|
| Autism                      | 1    | 12.5 | 0      | 0     | 1      | 20  | 1    | 33.3  | 0     | 10    | 0   | 10   | 4    | 9.5  |
| Intellectual disability     | 4    | 50   | 0      | 0     | 2      | 40  | 2    | 66.7  | 1     | 10    | 0   | 0    | 6    | 60   | 6    | 60   | 21   | 50.1 |
| Kinetic physical            | 2    | 25   | 1      | 50    | 1      | 20  | 0    | 0     | 0     | 0     | 2   | 50   | 2    | 20   | 0    | 0    | 8    | 19   |
| Downs syndrome              | 0    | 0    | 0      | 0     | 0      | 0   | 0    | 0     | 0     | 0     | 2   | 50   | 0    | 0    | 2    | 20   | 2    | 20   | 11.9 |
| Hyperactivity               | 1    | 12.5 | 1      | 50    | 0      | 0   | 0    | 0     | 0     | 0     | 0   | 1    | 10   | 1    | 10   | 1    | 12   | 8.9  |

Sig = 0.00135DF = 68.845 = x2
Sources: Authors

It means that the colours, which are proportional to their psychological and behavioural traits, should be used to design educational spaces for various groups of Exceptional children with different disabilities. The intellectually disabled children, who suffer from various symptoms and disabilities, should not be isolated from others but at the same time planning and design for them are necessary based on those symptoms. For example, some colours should be used for hyperactive children, who suffer from attention deficit problems, which are accompanied by more stimulating settings since according to Sunna (2009), they need to more attractive settings to become calm and to pay attention in certain situations.

4.2. Qualitative findings

Initially, in order to acquire deeper information regarding the quality of thinking and attitude of intellectually disabled children about their favourable school, they were asked to draw what they liked. It was in the context of ensuring that this research activity took place in a friendly and peaceful environment. Then their portraits were analysed by an expert and specialist in psychology of Exceptional children, and their results are as follows:

The results of analysis of the drawing of testees in this part signify that majority of them feel the sense of loneliness and autism in their world and they believe everything will remain fixed and static and nothing will be better for them. They assumed their world as isolated and think they cannot change anything in the environment (Fig. 1a). Likewise, lack of concentration and inattention is perfectly visible in some of the paintings (Fig. 1b).
The findings indicate that sense of security is one of the mental issues that hinder communication among the intellectually disabled child with his/her surrounding environment. It is clear that they feel a sense of stress and anxiety from their presence and activity in the environment and for this reason they look for security by drawing some physical elements like a fence and hedge in their pictures. Consequently, the results of this study regarding the importance of the existence of the security in the spaces, where intellectually disabled children are present, are consistent with findings of investigations of Ruth Lacason et al. (2001).

According to Fig. 3a and Fig. 3b, some of them suffer from emotional dysphoria and disturbance in the nervous system. The hyperactive children mainly use dramatic colours and emotional moods to draw attention. It seems that they like peace but love excitement even more.
As it observed in Fig. 4a and Fig. 4b, the elements of hostility, loss of mental focus and incomplete drawing are completely visible in their pictures. They limit their perception of the world around them and they need to have more freedom. Also, the results of studies about educational settings of intellectually disabled children by Abend (2001) confirms this fact as he asserts that these settings should include the least amount of constraints.

At the end of this section, with respect to mental symptoms and personality traits of the tested intellectually disabled children, which were extracted from their paintings by specialist in Psychology of Exceptional children, some strategies were proposed in line with the coordination of educational settings with these features:
Table 5. The extracted symptoms and suggested architectural strategies.

| Symptoms                  | Architectural strategies                                                                 |
|---------------------------|------------------------------------------------------------------------------------------|
| Sense of loneliness       | Design of settings for group activities and games                                         |
| Autistic                  | Design of stimulating settings to draw their attention and to strengthen interaction with  |
| Mental disturbance        | Creating peaceful environment with the help of normal and curved forms and mild colors   |
| Sense of disability       | Preparation of appropriate platform and opportunities to encourage the child to change    |
| Sense of insecurity       | Design of semi-restricted settings with the help of plants and embedding spaces           |
| Seeking for peace and calmness | Application of wooden materials, brick and glass                                            |
| Impatience and loss of focus | Making the environment interesting with the help of happy and stimulating colours          |
| Aggression                | Design a space for puppet shows                                                           |
| Need to emotional discharge | Design of space for performing musical activities                                           |
| Seeking for freedom (openness) | Using warm and energetic colours in the walls and pavements                              |
|                           | Application of comfortable and unconventional furniture                                   |

Sources: Authors

5. Discussion and conclusion

The purpose of this study is to identify and assess factors that strengthen the relationship with its surroundings for intellectually disabled children. The findings from the present research signify the importance of paying attention to physical factors like colours, types of materials, building form, dimensions and proportions of spaces according use and capacity of any area per capita as well as non-physical factors including sense of security, peace, focus and freedom.

The subject of (mental) focus in educational settings for intellectually disabled children is very especially important since the results of conducted studies during recent years have indicated that they are exposed to several problems in their learning, mental focus, attention and memory, and the existing educational setting in this country is not meeting their basic needs. The findings show that the majority of testees argue that it is better for them to have vacant classrooms so that they can more easily focus. In this case, classrooms with smaller dimensions should be designed for the intellectually disabled children to shorten the circle of their mental focus so that they can focus on educational activities more easily. At the same time, the capacity of classroom should be minimized (4-8 students) and also acoustic insulators should be utilised to obstruct entering noise into such spaces in order to provide the necessary conditions to create mental focus. Indeed, one could explore the effective environmental factors for learning, enhanced concentration and focus in intellectually disabled children in classrooms in another study.

The results of the qualitative section indicated that classroom colour might positively impact on behavioural modes in intellectually disabled children. Likewise, there is a significant relationship in the selection of colours and type of disability so this should be addressed in the design of spaces. Specifically, the colours to be used in educational settings for intellectually disabled children should be selected with respect to symptoms and type of
disability. For instance, one can use blue for a calming effect and also white that is a mild colour. Also, we can see in the inferential results that they have further emphasised these two colours.

One of the other factors, which may be very effective in this sense, is kind of lines and forms that are used in the design of their educational setting. The findings show that the intellectually disabled children preferred curved and normal forms. Which can be a very effective type of quality in the design of schools for exceptional children and they can lead to their better performance. At the same time, we may see in the inferential part (Table 1) that there is significant relationship between kind of the selected lines (curved or cursive) and the selection of geometric figures by the disabled children.

In a general review, one can conclude that the architecture of educational settings may remarkably impact on the behaviour of intellectually disabled children and this group of children have a special set of requirements for their educational environment to encourage progress, which requires special qualities, so these qualities should be proportional to their requirements and type of disability. Such environments can lead the disabled children to mental, behavioural and personality movement and growth.

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