

# On the Effect of Physical Attributes of Classroom Environment on the Creativity of Educable Mentally Retarded students

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# On the Effect of Physical Attributes of Classroom Environment on the Creativity of Educable Mentally-Retarded Students

## Abstract

Creating suitable classrooms that can meet the educational needs of mentally-retarded students is vitally important. The present study explores the effect of three physical characteristics of classroom environment on the creativity of educable mentally-retarded children: window view, window size, and classroom size. The participants, one hundred 9-to-11-year-old girl students, took the Test of Creative Thinking-Drawing Production (TCT-DP). The results indicate that natural window view, larger window size (which provides a broader vision), and larger class size positively affected the creativity of the students. The findings of the study can be taken into account in designing psychology-oriented classroom environments that can improve the creativity of students.

**Keywords:** *Classroom Physical Environment, Exceptional students, Creativity, Window View, Window Size, Classroom Size*

## 1. Introduction

The physical environment of the classroom has been the subject of many studies over the past few decades. Students spend thousands of hours in classrooms. Hence, classrooms are automatically among the most important physical structures in any society (Douglas & Gifford, 2001). Children will be attracted to the environments which help them address their internal conflicts and expand their sense of existence, internal consistency, and self-perception (Cohen, 1999). However, the main goal of classroom designing is creation of a space that students and educators will love (Douglas & Gifford, 2001).

So far, there has been an abundance of content on the classroom as an organizational structure or a social environment (e.g. Byrne, Hattie, & Fraser, 1986; Yuen-Yee & Watkins, 1994). Environmental factors affecting creativity have also been investigated from the point of view of social psychology (Chien & Hui, 2010).

Many studies have revealed the influence of the physical environment, both indoor and outdoor, not only on children's behaviors and their development, but also on adults (Abbot, 2001; Neuman & Dickinson, 2001; e.g. Moore, 2008). Read et al. (1999) studied the effects of ceiling height and wall color, as two of the physical characteristics of classroom environments, on student cooperation in elementary schools. With respect to space perception, Stankovic and Stojic (2007) stated that if spaces are constructed and equipped accurately, children would be able to improve their ability. Maxwell (2003) found that the classroom behavior of girls and boys was related to the spatial conditions of the classroom.

One of the objectives of educating normal children is to improve their creativity. However, due to the diverse definitions of creativity, it is hard to understand and study this notion

(Makhmalbaf & Yi-Luen Do, 2007). After psychologists found in 1950 that intelligence and creativity are not the same, the need for the perception of creativity was acknowledged, and research on this subject gradually extended (Shafaie & Madani, 2010). Bohm (1998) believes that human beings have intrinsic creativity which is linked with the environment where they grow up.

Creativity has traditionally been thought of a function of individual characteristics (Amabile, 1983; Barron, 1969; Guilford, 1968; MacKinnon, 1962; Stein, 1974; Torrance, 1966); however, there has recently been an increase in the number of studies exploring the effect of physical environment on human creativity. McCoy (2002) analyzed some of the elements of physical environments (such as lighting and color) in this respect.

Much information is available on the impacts of physical attributes of educational environments. However, few of the studies in this field have addressed the effects of the classroom's physical environment on disabled children. It is estimated that about 10% of the world's population live with at least one sort of disability (Lucas-Carrasco et al, 2011). According to the statistics published by the World Health Organization (WHO), about a tenth of the population of each country are disabled, of whom about 1.3% is children under 15 years of age (Khalifeh Soltani, et al, 2011).

The physical environment of a classroom should meet the educational needs and desires of mentally-disabled children, whose educational goal is not far from normal children. Abbas et al. (2009) found that the physical environment of the classroom affects the behavior of children and enhances more positive behaviors within the defined context.

Another noticeable fact about the previous research is that, to the best of our knowledge, they were not much concerned with the effect of physical environment of classrooms on the creativity of mentally-retarded students. The present work was an attempt to investigate the potential role of three physical characteristics of classroom environment in this regard: window view, window size, and classroom size.

## **2. Methods**

### *2.1. Participants*

Participants in this study were a total of 100 mentally-retarded girls enrolled in a school for exceptional students in Qazvin in Iran. They were in three age groups: 9-year-olds (33 students), 10-year-olds (33), and 11-year-olds (34).

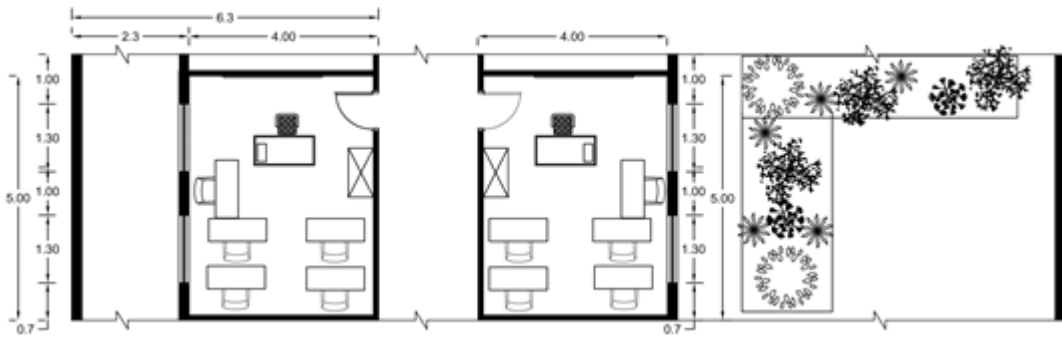
### *2.2. Physical characteristics of the classroom*

The objective of the present research was to study the impact of three physical features of classroom environment on the creativity of children with mental retardation: window view, window size, and classroom size. Six classrooms were used for this purpose. Aside from the three variables under discussion (i.e. window view, window size, and classroom size), all the other physical factors which could have otherwise an unwanted effect were controlled. These factors were room color (white), classroom shape (rectangular), ceiling height, and lighting color and intensity. The physical attributes at issue are described below.

#### *2.2.1. Window view*

Two classrooms (each 20 m<sup>2</sup> in area) were used to study the effect of window view on the creativity of students. One classroom provided a view to a natural landscape, and the other

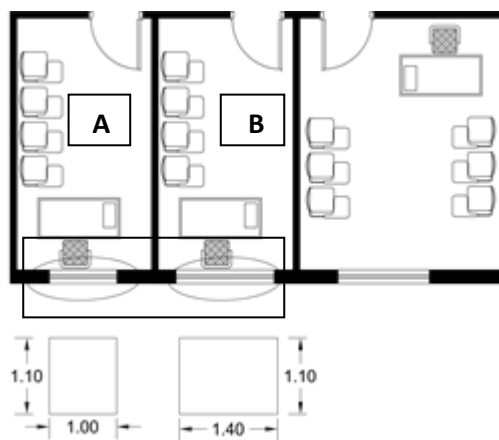
faced the adjacent buildings. Fig. 1 provides a schematic representation of the two classrooms. Each classroom had two same-size windows.



**Fig. 1.** Plan of the two same-size classes with different views (Reference: authors)

### 2.2.2. Window size

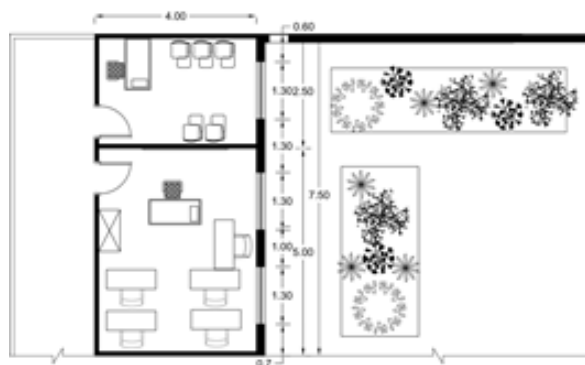
Two same-size classrooms (8 m<sup>2</sup> in area) were used to measure the effect of window size on creativity. As Fig. 2 shows, the windows in Classroom A had the dimensions 1.10 x 1.00, whereas Classroom B had windows with the dimensions 1.10 x 1.40. Both classrooms faced the adjacent buildings.



**Fig. 2.** Details of the two same-size classes with different window sizes (Reference: authors)

### 2.2.3. Classroom size

Two different-size classrooms (Fig. 3) were used. Classroom A had an area of 10 m<sup>2</sup>, but Classroom B was 20 m<sup>2</sup> in area. Both classrooms had a view to a natural landscape.



**Fig. 3.** Plan of the two classes with different areas (Reference: authors)

### 2.3. Test of Creativity

The creativity levels of students were measured using the Test of Creative Thinking-Drawing Production (TCT-DP). This test was developed by Urban and Jellen (1996) and has been used in various cultures. The test has been administered to people at various ages and with different abilities. It has been reported that the test shows no significant differences between male and female test-takers (Urban, 2005).

### 2.4. Procedure

There were a total of six test situations, with each participant taking tests in all the situations. We wanted to compare each student with herself in terms of the effect of the three variables of the research on creativity. There was a space of 10 days between every two tests. In each test session, which lasted for 15 minutes, the students were asked to do the TCT-DP test individually. To measure the effect of window view and classroom size, the

participants were placed in 20 groups of five. However, due to space limitations, the effect of window size was studied with the students being divided into 25 groups of four.

### 2.5. Data analysis

A repeated-measures design was employed: a single group of subjects giving data on different measures. The results of TCT-DP were analyzed using the SPSS 19 (2010) software.

The descriptive data for each test condition are given in Table 1.

**Table 1**

Summary of Descriptive statistics for the six test conditions

<i>Statistics</i>	Min	Max	Mean	SD
<i>Groups<sup>a</sup></i>				
Classroom with natural view	12	24	15.98	2.41
Classroom with building view	8	18	12.18	2.30
Classroom with 1.40x1.10 window	12	17	13.92	1.36
Classroom with 1.00x1.10 window	8	14	11.18	1.33
20m <sup>2</sup> Classroom	11	24	14.37	2.63
10m <sup>2</sup> Classroom	8	19	10.94	2.35

<sup>a</sup>N = 100

The results obtained from the One-Sample Kolmogoro-Smirnov test (Table 2) performed on 10 m<sup>2</sup> and 20m<sup>2</sup> classrooms and classrooms with small and large windows were significant, while the results obtained from classrooms facing natural and building landscapes were insignificant (P>0.05).

The window size and classroom size conditions showed abnormal data distribution patterns and required non-parametric tests (Wilcoxon and two related samples and test), while the



window view conditions showed normal data distribution patterns and required parametric tests (paired-sample t-test).

**Table 2**

One-Sample Kolmogorov-Smirnov Test

	Small Window	Large Window	Building View	Natural View	10m <sup>2</sup>	20m <sup>2</sup>
Kolmogorov-Smirnov Z	1.62	1.45	1.04	1.23	1.96	1.74
Asymp. Sig. (2-tailed)	0.01	0.03	0.23	0.09	0.001	0.005

### 3. Results

#### 3.1. The effect of window view on the creativity of mentally-retarded students

Concerning the effect of window view, the results of the t-test ( $T=26.98$ ,  $p<0.01$ ) (Table 3) suggest that there is a significant difference between the creativity level of students in the classroom with a natural view and their creativity level in the classroom with a view to the neighboring buildings. It is seen that natural window view can significantly increase creativity.

**Table 3**

Paired-samples T-test results for the effect of window view

	<i>M</i>	<i>SD</i>	<i>df</i>	<i>t<sub>obs</sub></i>
<i>Classroom with building view</i>	12.18	2.30	93	26.98*
<i>Classroom with natural view</i>	15.98	2.41		

\*  $P<0.01$

### 3.2. The impact of window size on children's creativity

The value of statistic Z ( $Z = 8.26, p < 0.01$ ) (Table 4) shows that there is a clear difference between the creativity scores of students in the classroom with large window (1.40 x 1.10 m) and their creativity in the small-window classroom (1.00 x 1.10 m). It seems that a larger window adds to the creativity of children by providing a broader view of the outside.

**Table 4**

Wilcoxon signed ranks for the effect of window size

	Mean rank	Z
Classroom with small window	22.8	
Classroom with large window	47.81	8.26*

\*  $P < 0.01$

### 3.3. The impact of classroom size on students' creativity

Table 5 shows that there is a significant difference between the creativity scores of students tested in the classroom with an area of 20m<sup>2</sup> and their creativity in the classroom which was 10m<sup>2</sup> in area ( $Z=8.33, p<0.01$ ). It can be seen that availability of more space increases creativity levels of mentally-impaired students.

**Table 5**

Wilcoxon signed ranks of different size of classroom.

	Average rating	Z
10m <sup>2</sup> Classroom	3.67	
20m <sup>2</sup> Classroom	46.94	8.33*

\* P< 0.01

#### 4. Discussion

This research was an attempt to identify the physical features of classroom environments that influence the creativity of mentally-retarded students. The attributes which were studied were window view (natural vs. building), window size (which gave the extent of view to the outside), and classroom size (10 m<sup>2</sup> vs. 20 m<sup>2</sup>). Analysis of the data showed that natural window view, using larger windows, and larger classroom size considerably increase the creativity of mentally-retarded children. This means that proper physical environment is a necessity at schools for exceptional children as it can provide an appropriate context for fostering the creativity of these students. The results of the present study are in line with those of the past research (e.g. Douglas & Gifford, 2001; Maxwell, 2003; McCoy & Evans, 2002; Read et al., 1999; Stankovic & Stojic, 2007). This research can contribute to the discussions of links between educational environments, mentally-disabled children, and creativity. Finally, we think that an investigation into the effect of classroom shape on the creativity of these students would be worth pursuing.

#### Acknowledgements

We thank all the participants and their teachers for being so generous with their time. Thanks also to Manuchehr Tabibian and Mahmood Soleimani for their technical assistance.

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