

The Role of Classrooms Interior Design in Creating a Creativity Supportive Environment in the Shade of the New Education Philosophy

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Abstract:

Formation of the Egyptian citizen is the Egyptian government's first priority as the human wealth is the most important capital. It is well known that the more investment in the human factor, the faster the nations' progress is achieved. Thus, developing education is an inevitable necessity for achieving the sustainable development, as it is considered the corner stone for renaissance and progress; therefore, the future educational system in Egypt was directed to be reformed to establish a highly strong, cultured and conscious mindful generation .

In the shade of the national project of developing education in Egypt, school books and teaching strategies have been changing without regarding of classrooms interior design. Whereas classrooms interior design lacks a lot of environmental, emotional, social, physical and psychological effects in a way blocking the achieving of new educational system's philosophy and goals. From this point, the research's problem comes.

So the research aims at studying interior spaces for classrooms to evaluate the current situation and monitor weak points that affect motivating the learner during the educational process. Also it aims at giving solutions in interior design contributing to applying the new educational system effectively in a way appropriate to Egypt's position and history as it has been the flame that illuminates the journey of human civilization.

Through merging between classrooms interior design elements, students learning styles and the new educational system philosophy, the research could find some criteria that enhance thinking and creativity for students. The research recommends caring for design and applied researches in the field of the primary schools and also using interior designers to find nontraditional solutions to face drawbacks in classrooms in the new educational system.

Key words:

Interior design – Classrooms – Creativity – Innovation – New educational system

المخلص:

إن بناء الإنسان المصري على رأس أولويات الدولة المصرية، حيث أن الثروة البشرية هي أهم ما تمتلكه الدول، ويقدر الاستثمار في العنصر البشري بقدر ما يتحقق تقدم الأمم، ولقد أصبح تطوير التعليم ضرورة حتمية لتحقيق التنمية المستدامة باعتباره الركيزة الأساسية للنهضة والتقدم؛ لذا تم التوجه لإعادة صياغة المنظومة التعليمية المستقبلية في مصر أملاً في تأسيس جيلاً قوياً يمتلك عقلاً واعياً ومخزوناً ثقافياً وافراً.

وفي ظل المشروع القومي لتطوير نظام التعليم في مصر، تم تغيير وتطوير الكتاب المدرسي واستراتيجيات التدريس دون مراعاة أسس ومعايير التصميم الداخلي للفصول الدراسية. كما أن التصميم الداخلي للفصول الدراسية يفتقر إلى الكثير من المؤثرات البيئية، والوجدانية والاجتماعية، والجسدية، والنفسية، بما لا يحقق فلسفة وأهداف النظام التعليمي الجديد بطريقة متكاملة، ومن هنا جاءت مشكلة البحث.

من هذا المنطلق يهدف البحث إلى دراسة الفراغات الداخلية للفصول الدراسية لتقييم الوضع الحالي وتحديد نقاط الضعف التي تؤثر على تحفيز المتعلم خلال العملية التعليمية، وتقديم حلول في التصميم الداخلي تساهم في تطبيق النظام التعليمي الجديد بطريقة فعّالة لتصبح البيئة التعليمية محفزة للإبداع والابتكار، وذلك لتحقيق التطوير الفعلي المتكامل لمنظومة التعليم في مصر، بما يليق بمكانة مصر وعراقتها التي كانت ومازالت الشعلة التي تضيئ مسيرة الحضارة الإنسانية. وقد توصل البحث من خلال الدمج بين عناصر التصميم الداخلي للفصول الدراسية وأنماط التعلم لدي التلاميذ وفلسفة نظام التعليم الجديد لعدد من المعايير التي يمكن أن تعزز عملية التفكير والإبداع لدي التلاميذ. ويوصي البحث بضرورة الإهتمام بالأبحاث التصميمية والتطبيقية في مجال مدارس التعليم الأساسي، وضرورة الاستعانة بمصممين داخليين للتوصل إلى معالجات غير تقليدية لمواجهة القصور في الفصول الدراسية في ظل نظام التعليم الجديد، حتي يوتي ثماره.

الكلمات المفتاحية:

التصميم الداخلي، الفصول الدراسية، الإبداع، الابتكار، نظام التعليم الجديد

Introduction:

Education is considered the corner stone for renaissance, progress and development. The issue of education is one of the most worrying issues in Egyptian society as the Egyptian education system, with all its levels and elements, has been suffering from problems and challenges that are a real obstacle in front of improving educational process and consequently comprehensive development. Therefore, education has become the corner stone in modernization and development program adopted by Egyptian country due to its vital role in building up the Egyptian character and improve his practical and scientific skills.

Education is at the top of the Egyptian government's development plan priorities so there is a continuous effort to upgrade educational system in Egypt. Whereas primary stage is the base for all other stages and the base for forming student's character so it was the main concern to establish more and more schools to face the increasing number of students. Unfortunately building more schools that can include all numbers of students is not enough for improving education as it doesn't create appropriate educational environment so the courses of the first two grades have been upgraded but unfortunately the effect of interior design on the success of educational process wasn't taken into consideration.

Research problem:

Research problem lies in incompatibility between classrooms interior design and new educational system that supports creativity and innovation as the current design blocks achieving the new system's goals effectively.

Research aims:

- Suggesting bases and criteria for classrooms interior design to be fit to the new educational system.

Research importance:

- Taking a part in achieving the actual improvement for the educational system in Egypt coping up with the new educational system and students' learning styles.

Research hypotheses:

The research supposes that the new criteria of classrooms interior design will take apart in applying the new educational system effectively.

Research limits:

Time limits: since applying the new educational system at school year 2018/2019 till now.

Place limits: some primary schools (first and second primary grades) in Damietta governorate.

Research Methodology:

The analytical descriptive method has been used as it is the best method for that research; this is through describing and analyzing the current situation of first two grades classrooms in Egyptian government schools to set classrooms interior design bases and criteria in a way stimulating creativity and innovation that cope with the new educational system's philosophy.

Theoretical framework for research:**New educational system's philosophy:**

New educational system's philosophy is based on dealing with educational process as a comprehensive integrated system with all its sides, scientific, educational, cultural and sport. It aims at reaching the stage of understanding and innovation and improving creativity ⁽¹⁾. Improving creativity is not something additional but it is an important side that must be dealt with.

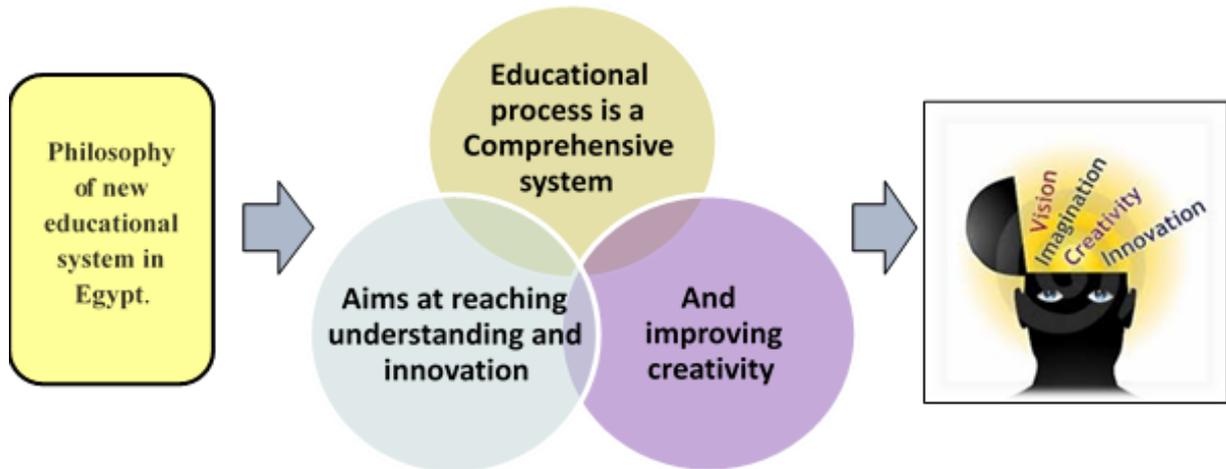


Fig. (1): shows the philosophy of new educational system in Egypt.

There are some factors that play a role in improving children's creativity such as classrooms interior design that is a part of educational process (Fig. 2) as it plays an important role in forming child's character and providing a suitable climate for healthy growth for all physical, mobility, mental, cognitive, linguistic and, aesthetic, psychological, social and emotional sides, it is essential and helps to have various teaching methods inside the classroom to fit all learning styles ⁽²⁾. All these factors can make the educational environment comprehensive, safe, rich with stimuli and develop child's mental abilities and also stimulate students for positive Academic achievement, creativity and innovation.

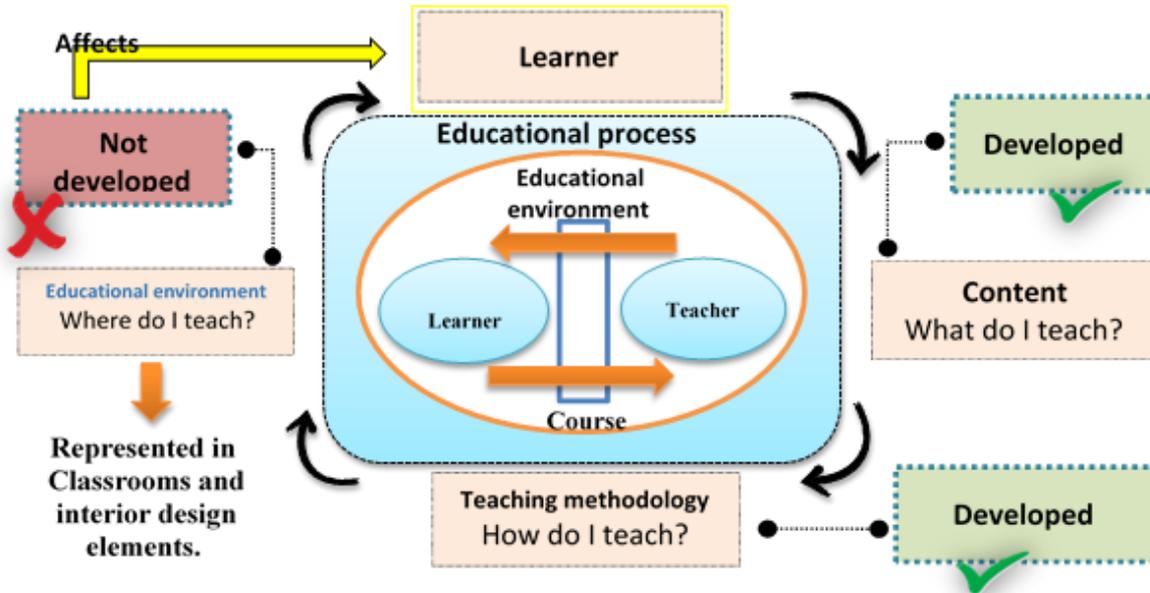


Fig. (2): Shows education process as a comprehensive system and each part affects the other.

Learning styles:

Are the methods that through which the learner learns well. It also defined as characteristics, cognitive, emotional, and physical behaviors that form fixed indicators for cognition, treatment and interaction with the educational environment.

The Dunn and Dunn Learning Style Model of Instruction:

This model depends on a theory stating that each student has his/her own way of learning. It aims at improving education's affectivity through characterizing and fitting learning styles to suitable educational chances.

He divided learning styles into 5 main divisions that are calls motivations, these main divisions include 20 different elements affecting learners and here are the five main divisions with some of their elements⁽³⁾:

1. Environmental pattern:

How much the student prefers environmental elements during learning for example: background sounds during learning, favorite light level and preferred temperature.

2. Physical pattern:

Learning through senses such as listening, sight, touching and moving and whether he/she prefers moving or keeping still during learning.

3. Psychological pattern:

Related to student's behavior which is either impulsive or reflective and controlling the brain's left side or right side (analytical – comprehensive).

4. Social pattern: Working individually or in a group

5. Emotional pattern:

Related to elements that develop emotions such as:

- Planning: the choices that the learner takes to reach his goal.
- Perseverance: student's determination on learning, performing the educational task, the ability to pay attention and level of concern.
- Responsibility: relating to how far preferring working independently with the least supervision.
- Motivation: does he have self-motivation or it is launched through learning with colleagues?

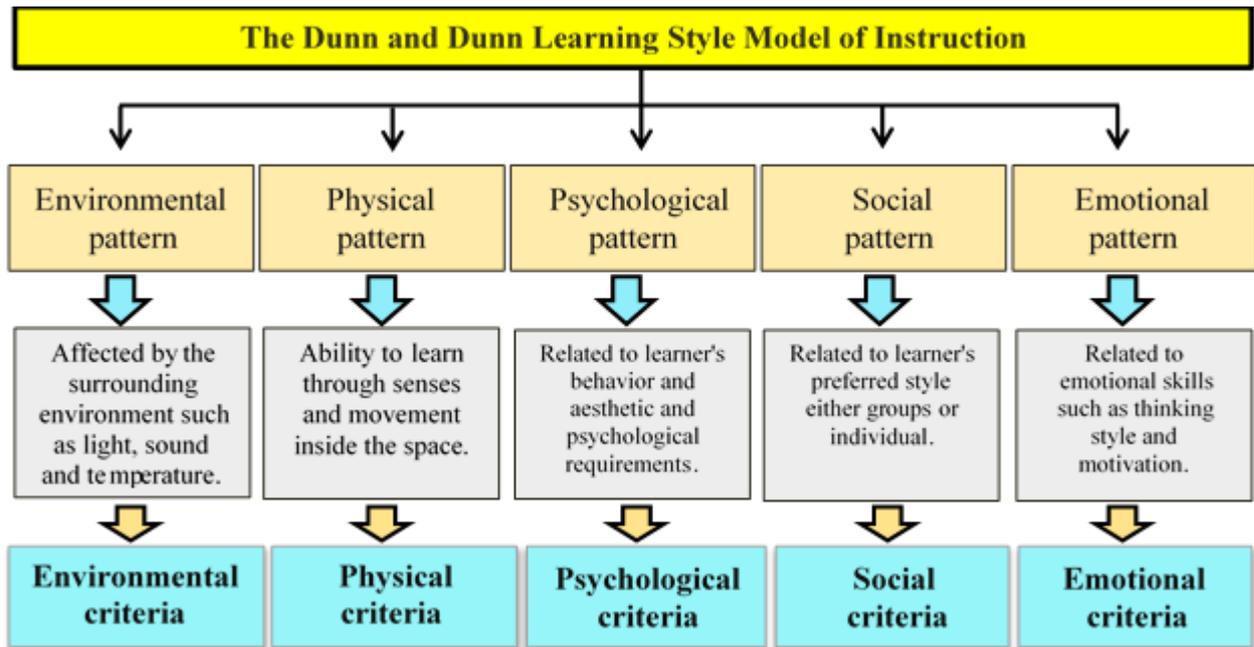


Fig. (3): Shows the learning patterns of students according to the Dun and Dunn model, as well as the criteria for interior design for the classrooms of the new education system - (By researchers).

Classrooms interior design criteria that cope with the new educational system according to Dunn & Dunn learning styles pattern:

Interior design criteria for educational environment inside classrooms are defined as: a group of requirements that must be found in classrooms' interior spaces with its physical and sensual elements. These criteria aim at coherence with the new educational system philosophy and achieving an effective educational environment helping for creativity and innovation; the absence of these requirements affects the quality of working environment inside the classroom. Interior design criteria can be divided according to **students' learning styles**:

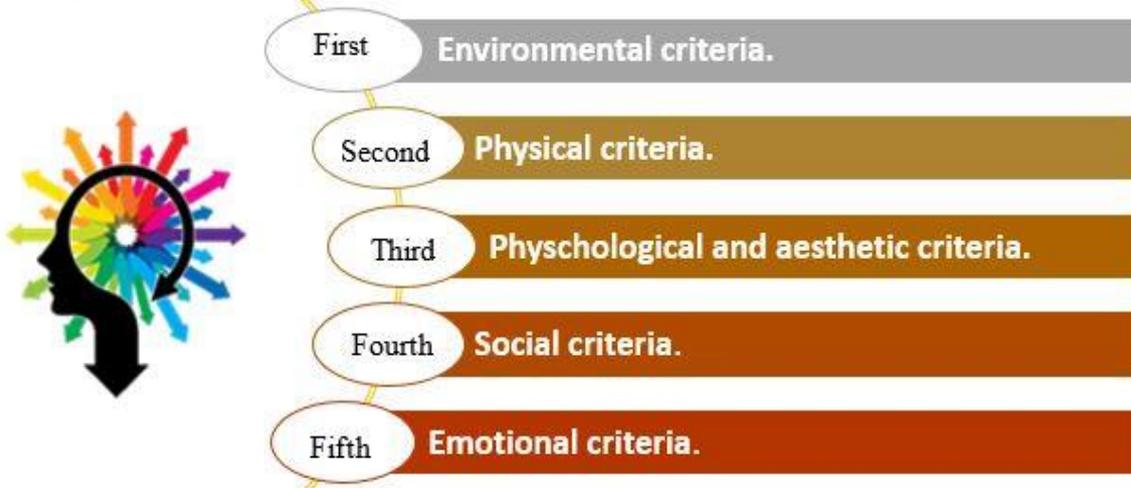


Fig. (4): Illustrates classrooms' interior design criteria in a way that is motivating creativity and innovation (By the researchers).

First: Environmental criteria :

Some criteria, using these criteria according to ideal bases help to perform various jobs in a healthy environment to improve creativity and innovation, affect classrooms interior environment. Criteria are divided into:

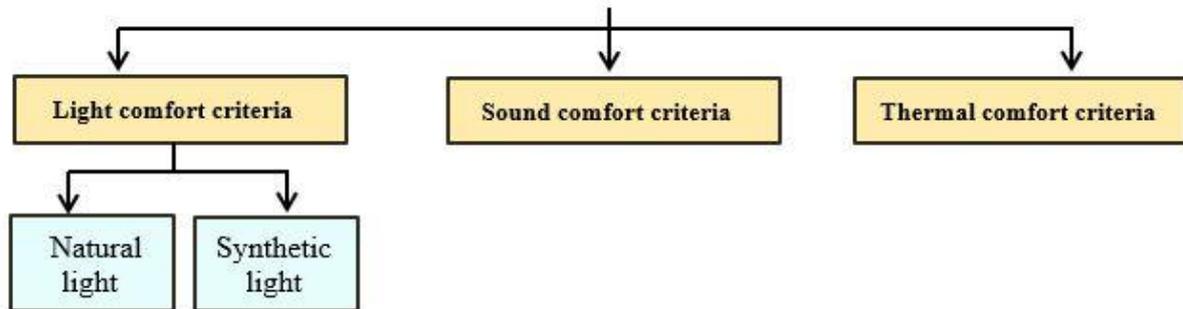


Fig. (5) Illustrates environmental criteria
(By the researchers)

1- Light comfort criteria:

Light plays a great role in educational process, inside any classroom light tense affects good sight conditions. Light should be equally distributed inside the classroom and it shouldn't be bright. Light is divided into:

A-Natural light:

It has a vital role in creating a creativity stimulating environment inside the classroom. It also improves the level of understanding and activity and also achieves an increase in students' performance in addition to improving the mood inside the classroom ⁽⁴⁾. Main windows are preferred to be at the left so there will not be a shadow preventing the clear vision ⁽⁵⁾.

A lot of researches emphasized the importance of natural light and its simulating aesthetic light. It positively affects performance and its quality ⁽⁶⁾. Solar shutters either modern or traditional should be used with the aim of eliminating direct sunlight and the resulting brightness and high temperature, they also decrease reflections on interior design elements inside the classroom ⁽⁷⁾.

B-Synthetic light:

Synthetic light is used inside classrooms as we cannot depend only on natural light as it changes during the day and according to weather conditions, and we should take into consideration the below:

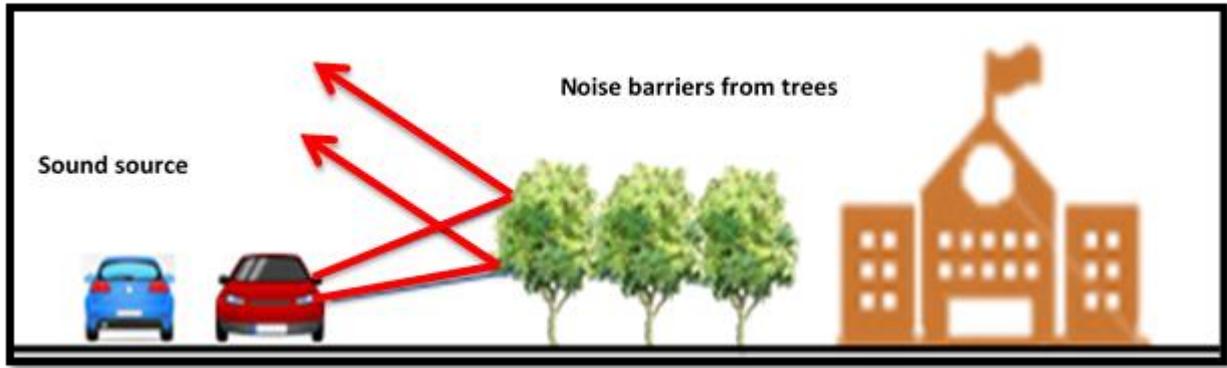
It also helps in showing details and colors accurately and reduces brightness on papers and books so reading becomes easier and less harmful. Florescent lights may cause hyperactivity for students that suffer from decreased productivity and attention ⁽⁸⁾.

2-Sound comfort criteria:

Noise affects the performance of both the teacher and the student inside the classroom. According to "WHO", noise level should not pass 35 Db. As beyond it the learning ability decreases.

Noise can be treated by:

a- Using natural barriers such as trees that decrease noise with range 6-7 Db. And these trees must be high and dense to be a barrier for noise ⁽⁹⁾.



Shows the use of trees as natural noise barriers. Fig. (6):
Source: the researchers.

b- Using built concrete barriers especially at the direction of noise source.



Pic. (1-2) Shows using noise barriers to reduce noise.

<https://www.multivario.co.uk/transparent-noise-barrier-panels>

c- Using Porous materials in interior surfaces helps in reducing Acoustic echo and improving speech clearance ⁽¹⁰⁾.

d- The tight closing for Architectural openings (Windows and doors) is a must, besides making periodic maintenance for them.

3- Thermal comfort and air quality criteria:

Thermal comfort criteria have a very important role in affecting students' health and providing a suitable educational environment for concentrating and understanding. Thermal comfort is achieved at temperature between 22.5 and 29.5 and humidity level ranges from %20 to %50 and air speed should equal 1 m/s. In order to achieve good and continuous ventilation inside classrooms:

- Windows area should equal %25 of class's wall area ⁽¹¹⁾.
- Windows should be distributed in more than one direction
- High windows should be put in the direction of un preferred wind ⁽¹²⁾.

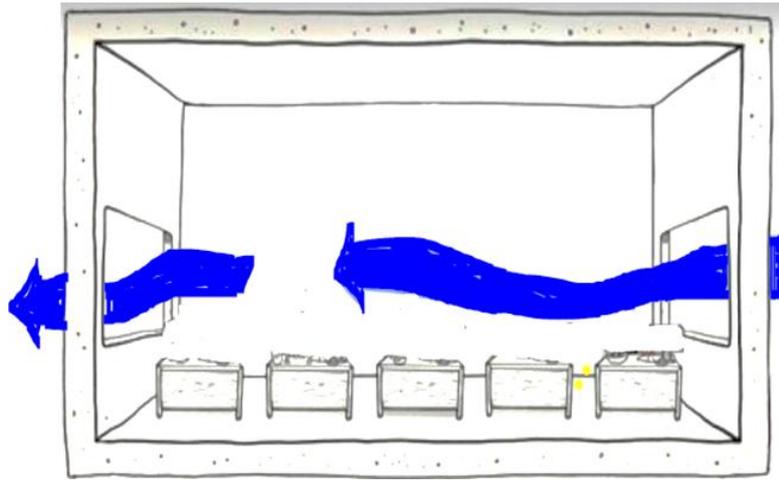


Fig. (7) Illustrates windows from more than one direction.

<https://indiansustainability.wordpress.com/2015/08/04/importance-of-cross-ventilation/>

At choosing the materials of interior surfaces such as floors, walls and ceilings we should avoid using materials that are launching Formaldehyde and volatile organic compounds in the air and all materials should be tested before using them including furniture in order to define their effect on the quality of air ⁽¹³⁾.

Second: Physical criteria:

Physical criteria are defined as a group of criteria providing healthy climate inside the classroom and helping in building students bodies properly and avoiding a lot of diseases. They also help in performing various activities safely. Students' physical health is affected by environmental criteria and interior design components as below:

- Caring for achieving light comfort criteria leads to avoiding permanent or temporal problems in optical device as the increase in brightness causes headache ⁽¹⁴⁾.
- Taking care of air quality leads to respiratory integrity and reduces infection and spread of diseases ⁽¹⁵⁾.
- Excessive noise may cause various health problems.

The relation between physical criteria and furniture design:

Furniture is one of the important interior design elements as it is in direct contact with students inside the classroom. The unsuitable design or sitting improperly may cause pain and defects in backbone, accordingly:

- School furniture should be comfortable to fulfill physical needs whereas the chair should be convenient with the student's backbone and feet should be on the floor ⁽¹⁶⁾, as illustrated in Fig. (8)
- Chair's front edge should be bent so as not to press leg's vascular system, as shown in Fig. (9).

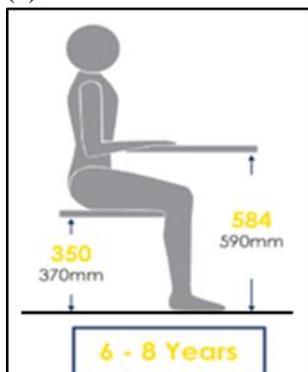


Fig. (8) Shows the appropriate height for the chair and shows that student's feet is on the floor.
Source:
<https://www.gopak.co.uk/useful-buyers-guides/height-guide>

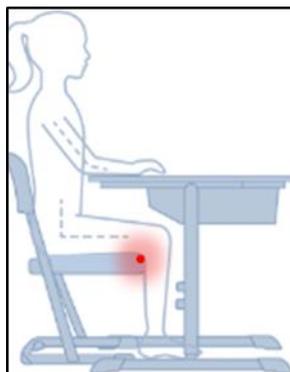


Fig. (9) A picture shows the straight end of the chair so it presses leg's vascular system.
Source:
<https://www.woodsurniture.com.au/optimal-height-guide/>

- Furniture should be put in a way to achieve more chances for the students to move and interact with the teacher and also to prevent wrong seating with twisting neck for long times that causes pain in neck, muscles and bones ⁽¹⁷⁾.
- Seats should be put on the shape of Horseshoe or semicircle so all students can see the teacher easily without the need for twisting their backbones.



Pic. (3-4) shows different types of Horseshoe or semicircle tables

Source: <https://www.lakeshorelearning.com/products/classroom-furniture>

https://store.schoolspecialty.com/OA_HTML/ibeCCTpItnDspRte.jsp?minisite=10224&item=2048400

Experiments proved a variety in students' sizes so the table and chair should be flexible and changeable that give students a chance to sit comfortably. It is also proved that there should be a slope in table surface while drawing, coloring and writing to improve handwriting and work accuracy, that can increase students' creativity by increasing writing, self-express ability, delivering ideas easily and acquiring various skills ⁽¹⁸⁾.



Pic. (5) Show the flexibility in chair and table's height and also table's slope. Source: <https://picclick.com/Pink-Height-Adjustable-Desk-and-Chair>

- Furniture should also be light and easy to move so the student can move and arrange it according to his/her preference in addition to safety conditions. The students who are younger than 8 years old should not carry furniture heavier than 12.3 kg ⁽¹⁹⁾.

Third: Psychological and aesthetic criteria:

It is very essential to create a connection between interior design and students psychological needs especially in early grades. This stage is considered the time for improving skills, forming character and interior environment elements that affect student's psychology and aesthetic perception ⁽²⁰⁾. So all interior design elements inside the classroom should be coherent with

student's psychological, aesthetic, cultural and cognitive requirements. Below we will see the effect of color, and music in enhancing student's psychological and aesthetic sides:

A- Colors and their effect on students inside the classroom:

Arranging colors inside classrooms is one of the important criteria affecting students and it has an effective role in improving cultural and cognitive skills, it is also considered an incentive for learning if used properly ⁽²¹⁾, and it should cope with basic requirements of educational activities as colors can ⁽²²⁾:

- Develop aesthetic sense for the student and achieve balance.
- Colours are strong visual incentive that improves concentration, activity and develops memory.
- Enhance creativity, imagination and problem solving ability and decrease boring interior space inside the classroom.
- Affect students' behavior inside the classroom (Loud colors create loud ideas).
- Create a mutual language with students and decrease anger, fear and enhance feeling of comfort.

A lot of studies assured that light degrees of yellow are the most attractive colors and work on improving stimulus without annoyance. They work on stimulating brain cells. Also blue and green have the same effect with controlling the color's degree according to a pre plan to increase stimulus but with less degree ⁽²³⁾, and they calm students down but through long times they cause depression so the white color is used widely in classrooms as coloring plan depends on cold colors ⁽²⁴⁾.



Pic. (6-7) show using blue and green in classrooms with different degrees and using white areas.

<https://envoplan.co.uk/education-news/classroom> -
<http://coreinspiration.blogspot.com/2015/09/classroom-reveal->

Bright colors can be used in pictures, and educational wall panels without excision. Floors shall be close to walls colors ⁽²⁵⁾.

It should be considered that educational activities or aids should contain variety of colours so interior space should have less colours and it should not exceed 6 colours ⁽²⁶⁾, in order to simulate students without hurting their eyes.

B-Music and its effect on students inside the classroom:

Music is considered one of the effective factors inside the classroom as it helps in increasing productivity. The presence of music and using it in suitable times with suitable volume coping with previously mentioned environmental criteria can enhance creativity ⁽²⁷⁾, give chance for relaxing and improve classroom climate.

Fourth: Social criteria:

Social criteria play a very important role in forming a healthy generation integrated with their environment. Social forming aims at forming child's character including all spiritual, mental, physical, behavioral and cognitive sides as it aims at turning the child to be interactive and to have the ability to do his/her social roles effectively.

In order to achieve effective social criteria inside the classroom. Classroom's area should be suitable for number of students. "OEA" (Ohio Education Association) defined that the perfect size is 25 student or less and educational studies that approved by "AERA"(American Educational Research Association) assure that the class that contains about 13:17 student gives the best results in educational process and helps in improving their creativity⁽²⁸⁾ it also helps the teacher to manage the class effectively and achieves social interaction.

The traditional method of arranging seats no longer encourages creativity so classrooms have to be rearranged in a way that can achieve effective interaction between the student and the teacher so the student is no longer just a receiver. It facilitates to create communication and cooperation among students that forms the feeling of one team and spreads free discussion and fruitful dialogue⁽²⁹⁾.

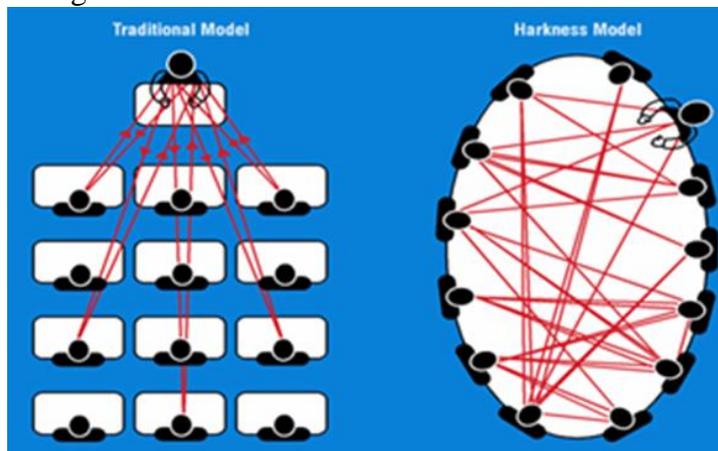
The good planning for classrooms' area leads to performing educational activities properly and achieving flexibility as students can move and speak freely so it is preferred to use movable seats and closets so as it can be moved to reshape the class during different activities.



Pic. (8-9) shows light movable tables and chairs to be suitable for different activities and learning styles

Source: <https://www.pinterest.cl/pin/404831454005028424/>

Also Harkness method can be applied. It aims at turning classrooms into circular groups instead of sitting in lines⁽³⁰⁾, as shown in pic. (10). It makes social interaction easier and also the communication is much easier and results in higher levels of achievement and self-respect, it also expresses thoughts and ideas clearly, sharing with others and listening to them and also develops critical thinking⁽³¹⁾.



Pic. (10) (Harkness Method

<https://www.pacificridge.org/academics/harkness-learning>

Fifth: Emotional criteria

Emotional criteria are one of the most important factors in educational process, and it can be achieved in classrooms by providing some elements that work on improving emotions and enhancing traditions during educational process, they are also connected to students' interests (32).

Classrooms' interior space should be flexible, free from obstacles, so that the student can reshape it under teacher's supervision. This action teaches important values such as adapting easily to life and environmental changes, independence and self-realization (33). Emotional side and educating students and improving their creativity through using interior space can be as below:

- Empty **walls** are considered an area free of obstacles and they can be integrated in educational process and also can be reformed differently in a way that provides a rich environment that stimulates creative thinking (34).



Pic. (11-12) using the physical surrounding environment such as walls in educational process that enhances cognitive stimulus for students.

<https://www.pinterest.com/pin/743516219702801117>

<https://www.wawaking.com.tw/ItemDetail?d=H2019>

Floors also can be used to give students a chance for learning through playing and moving and forming a creative educational environment by using the necessary means of education for teaching as shown in pictures (13-14).



Pic. (13-14) show using floors as means of education.

<https://www.pinterest.com/pin/479281585346425774/>

<https://www.chron.com/neighborhood/article/Just-add-students-at-new-Horn-Elementary-9418299.php>

- A **specific area** can be specified inside the classroom to **discover and improve creative thinking** through practicing various activities such as reading, listening, performing plays, handmade activities and discussion of ideas.



Pic.15 shows specifying places for different activities such as reading, art works and also shows various sitting forms to cope with students' attitudes.



Pic. 16 specifying area inside the classroom for art works presentation and discussion to enhance self-confidence and develop criticism skills and ideas presentation.
<https://www.pinterest.co.uk/pin/2640235968>

- **Modern technology** can be used in an interactive way in walls and floors inside classrooms to create interactive educational environment to attract students.



Pic. (17) using smart boards in educational process.
<https://www.sutori.com/story/from-blackboards-to-smart-boards>



Pic. (18) using smart interaction floors in educational process.
<https://www.lekeland-grossisten.no/produkt/elektronisk/crm-kasse->

Field and analytical study for some classrooms interior spaces to evaluate the current situation after applying the new educational system:

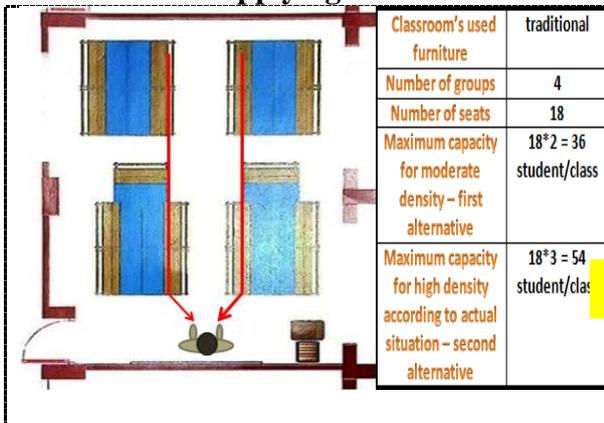


Fig. (10) The official publication for educational buildings authority shows furniture distribution models for first three stages.



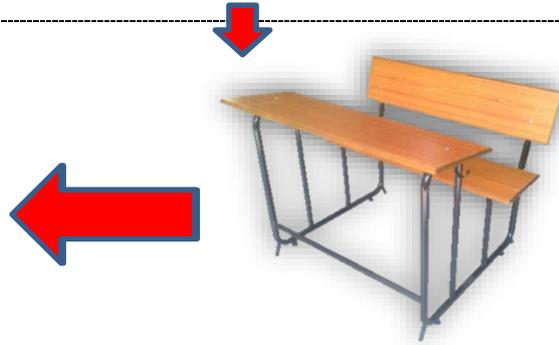
Pic. (19) Shows the result in applying authority's model.

The previous model shows the following:

- The design of seats does not achieve flexibility inside the space so students sit in wrong positions to follow the teacher and the board and this wrong position results in problem in their backbones.

Fixed seats lead to:

- Health problems in backbone.
- Difficulty in following up the teacher and the blackboard.
- Difficulty in moving inside the classroom.
- Not suitable for all learning styles.
- Not suitable for all activities.



- There are no sub movement passages at right and left to enable students to move and get out of seats easily and safely and also blocks the teacher from observing the all of students.



Pic. (20) Shows covering windows with educational means that reduces natural light and creates unwanted shadows in addition to the malfunctions of some synthetic lights.



Pic. (21) Shows the bad distribution of light as there are some bright places and the others are dark. Also, there is no control for direct sunlight that creates sight disruption.



Pic. (22) Show plenty of educational means and the lack of coordination that may cause distraction.



Pic. (23) Show plenty of educational means around the blackboard and some of them are below vision level.

Both pictures show the wrong position for students to follow the teacher and the blackboard after applying authority's model- This is outcome of student's high density inside classrooms, and also the heavy seats that lack flexibility, for they cannot move them according to their needs.

A questionnaire to measure the effectiveness of classrooms' interior design while applying the new educational system

Society and sample: The questionnaire was prepared using Google Forms and it was electronically sent to some teachers of first and second primary grades in governmental schools. Responds are from 166 teachers from different schools in Damietta governorate, in order to get the required information.

Here are the study's results:

❖ Results of constructive validity of the axes of the questionnaire.

In order to assure the constructive validity; Correlation coefficient was calculated between total marks for each axis and the total marks of the questionnaire and the results are shown as below:

Table (1): Correlation coefficient among total marks of each axis and total marks of the questionnaire

Questionnaire axes	Correlation coefficient	Significance level	Statistical significance
Environmental constraints	0.81	0.01	Significant
Physical constraints	0.52	0.01	Significant
Psychological and aesthetic constraints	0.60	0.01	Significant
Social constraints	0.65	0.01	Significant
Emotional constraints	0.80	0.01	Significant

Table (1) shows the Correlation coefficients between total marks for each axis and the total marks of the questionnaire as they are ranged from (0.52-0.81) and all of them are so statistically significant, that shows the validity and homogeneity of the questionnaire axes

❖ Statistical results for the first axis: environmental constraints

Table (2): repetitions and percentages of samples responses regarding environmental constraints.

Items	Response					
	Yes		Almost		No	
	Repetition	%	Repetition	%	Repetition	%
1. Does the classroom represent a suitable educational environment for the new educational system?	34	0.48%	74	44.58%	58	34.94%
2. Is ventilation enough?	58	34.94%	82	49.40%	26	15.66%
3. Is synthetic light (Florescent lights) used in the classroom?	98	59.04%	40	24.10%	28	16.87%
4. Does the classroom depend on mixing between the natural and synthetic lights?	110	66.27%	34	20.48%	22	13.25%
5. Does the classroom contain means helping to limit problem of direct sunlight?	52	31.33%	52	31.33%	62	37.35%

<p>6. Which of the following is in the class? (You can choose more than one).</p> <ul style="list-style-type: none"> • Data show. • White board. • Computer. • Smart board. • Internet. 	<p>14 (8.43%) 156 (93.98%) 26 (15.66%) - -</p>
<p>7. Which one is more attractive for the child?</p> <ul style="list-style-type: none"> • Technological means • Traditional means 	<p>146 (87.95%) 20(12.05%)</p>

Table (2): shows repetitions and percentages for samples' responses regarding environmental constraints as about 66.327% of them stated that classroom depends on mixing between natural and synthetic lights. Also half of them stated that there are no means to eliminate the problems of sunlight and also that the classroom is not suitable for the new educational system. About 93.98% of them stated the presence of white boards in the classroom and %87.95 of them stated that technological means are more attractive for children.

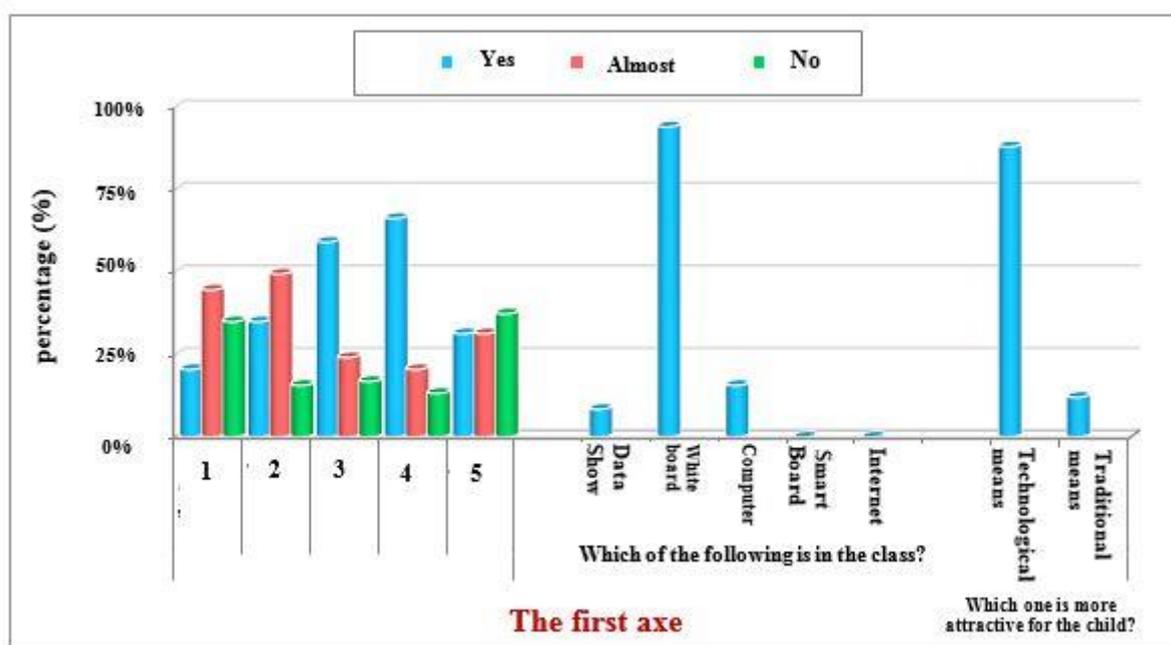


Figure (11) shows environmental constraints according to their percentages.

❖ Statistical results regarding physical constraints.

Table (3): repetitions and percentages for samples responses regarding physical constraints.

Items	Response					
	Yes		Almost		No	
	Repetition	%	Repetition	%	Repetition	%
8. Is the design of chairs and tables comfortable and suitable for all activities? (Listening, Conversation, writing, reading, and art works... etc.).	-	-	14	8.43%	152	91.57%
9. The noise resulting from outside the class:						
• Acceptable and can work through it.)8.43%(14					
• Loud and cannot concentrate because of it.	114(68.67%)					
• No noise.	38 (22.89%)					

Table (3) shows repetitions and percentages for samples responses regarding physical constraints. 91.57% of them stated that design of chairs and tables is not comfortable and not suitable for new educational system. Also 68.67% of them stated that the noise coming from outside the class is loud and they cannot concentrate because of it.

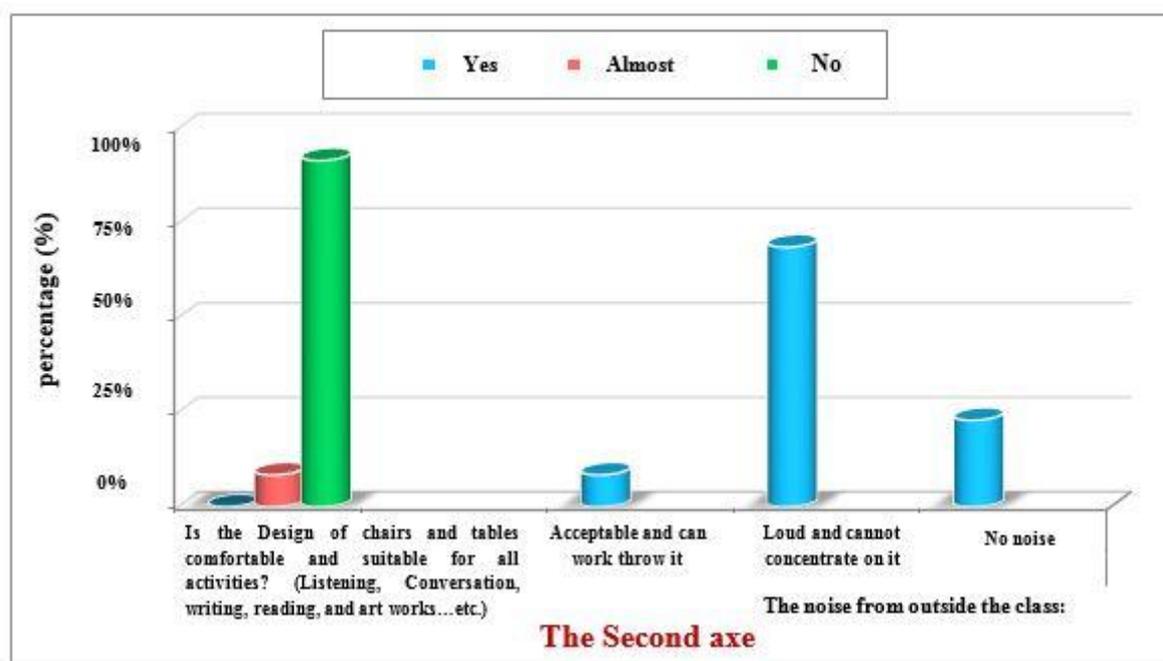


Figure (12): shows physical constraints according to their percentages.

❖ Statistical results for the third axis regarding psychological and aesthetic constraints:

Table (4): repetitions and percentages of samples responses regarding psychological and aesthetic constraints.

Items	Response					
	Yes		Almost		No	
	Repetition	%	Repetition	%	Repetition	%
10. Are music listening devices available in classrooms?	54	32.53%	-	-	112	7.47%
11. Do Educational means cause distraction for students?	16	9.64%	44	26.51%	106	63.86%
12. Classroom's colors are:						
• Yellow to orange (beige).	124 (74.70%)					
• Light green.	8 (4.82%)					
• Greenish blue.	34 (20.48%)					

Table (4): shows repetitions and percentages for samples responses regarding psychological and aesthetic constraints as 67.47% of them stated that there are no devices to play music sometimes and 63.86% of them stated that educational means on walls do not cause distraction and 74.70% of them said that classrooms' colors are yellow to orange (beige).

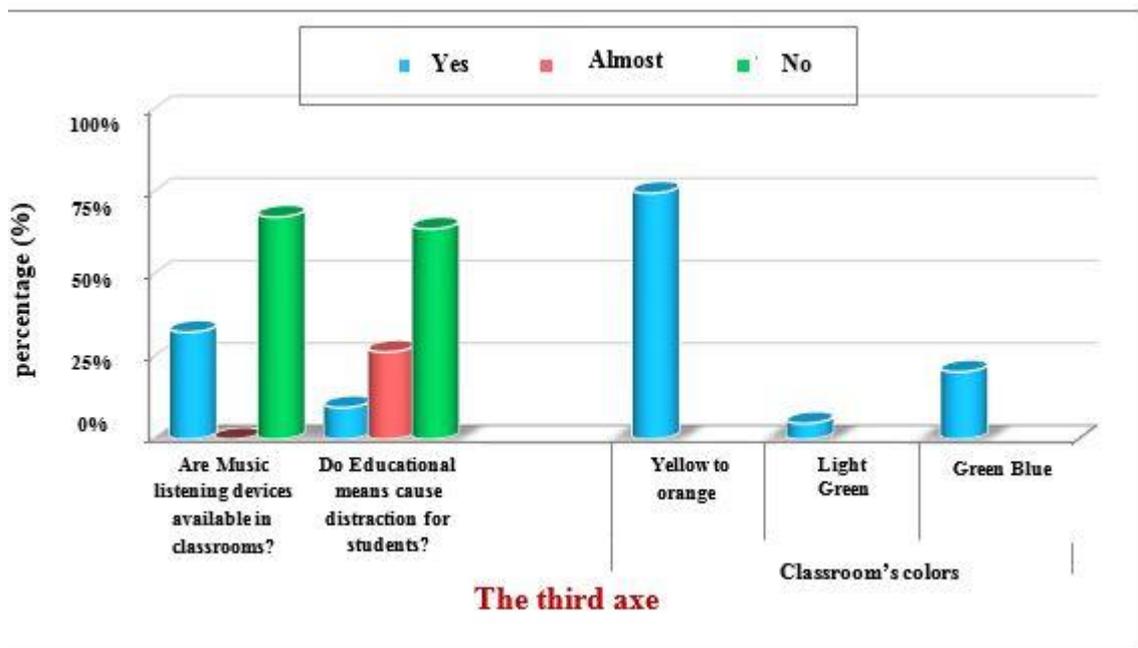


Figure (13): shows psychological and aesthetic constraints according to their percentages.

❖ Statistical results for the second axis concerning social constraints.

Table 5: repetitions and responses of samples regarding social constraints

Items	Response					
	Yes		Almost		No	
	Repetition	%	Repetition	%	Repetition	%
13. Furniture distribution inside the classroom is flexible and helps in performing individual and group activities effectively?	26	15.66%	48	28.92%	92	55.42%
14. Classroom's area is convenient with number of students?	42	25.30%	-	-	124	74.70%
15. Number of students range:						
• 20-30.	16 (9.64%)					
• 30-40.	22 (13.25%)					
• More than 40.	128 (77.11%)					

Table (5) shows repetitions and percentages of samples responses regarding social constraints as 74.70% of them stated that classroom's area is not convenient to number of students, more than the half stated that furniture inside the classroom is not flexible and does not help to perform individual and group activities and also 77.11% of them stated that the number of students is more than 40 in the class room.

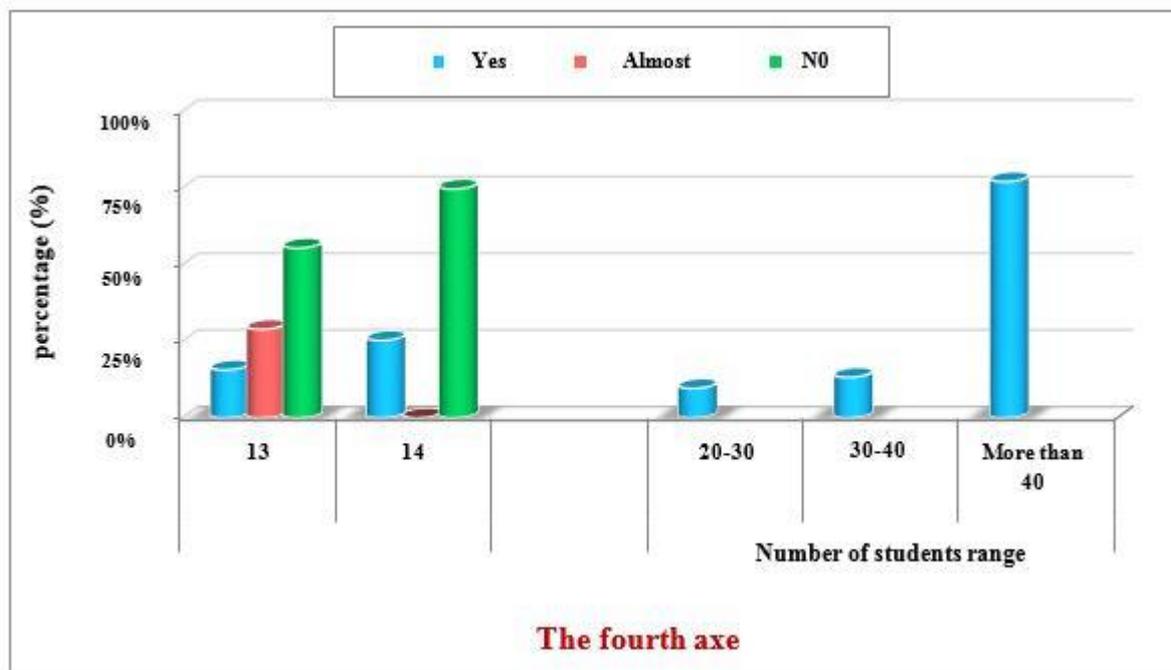


Figure (14) shows social constraints according to their percentages.

❖ **Statistical results for the fifth axis regarding emotional constraints.**

Table 6: Repetitions and percentages of samples responses regarding emotional constraints.

Items	Response					
	Yes		Almost		No	
	Repetition	%	Repetition	%	Repetition	%
16. Does the classroom have a suitable area for drawing, handmade works and an area for presenting them and discussing them with friends?	46	27.71%	-	-	120	72.29%
17. walls are used as interactive educational means to improve child's creativity.	66	39.76%	-	-	100	60.24%
18. Floors are used as interactive educational means to improve child's creativity.	36	21.69%	-	-	130	78.31%
19. Classrooms colors are stimulus and achieve activity.	38	22.89%	68	40.96%	60	36.14%

Table (6) shows repetitions and percentages of samples' responses regarding emotional constraints as 78.31% of them agreed on not using floors as educational means to improve child's creativity and 72.29% of them stated there is no enough space in the classrooms for drawing and present handworks, and 60.24% stated that walls are not used as educational means to improve child's creativity.

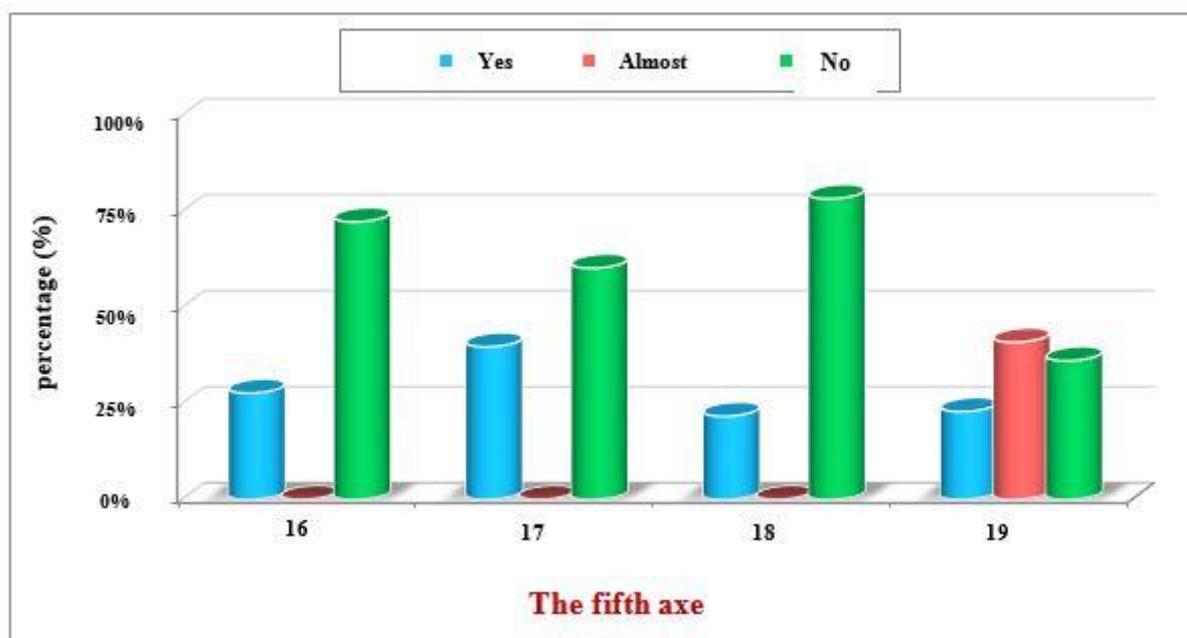


Figure (15) shows emotional constraints according to their percentages.

The most important results of the questionnaire.

Environmental constraints:

- Half of the research sample stated that there are no means to eliminate the problems of sunlight and also that the classroom is not suitable for the new educational system.

Physical constraints:

- 91.57% of the research sample stated that design of chairs and tables is not comfortable and not suitable for new educational system.
- 68.67% of them stated that the noise coming from outside the class is loud and they cannot concentrate because of it.

Psychological and aesthetic constraints:

- %67.47 of the research sample stated that there are no devices to play music.

social constraints:

- 74.70% of the research sample stated that classroom's area is not convenient to number of students.
- More than the half of them stated that furniture inside the classroom is not flexible and does not help to perform individual and group activities.
- 77.11% of them stated that the number of students is more than 40 in the class room.

Emotional constraints:

- 78.31% of the research sample agreed on not using floors as educational means to improve child's creativity.
- 72.29 % of them stated that there is no enough space in the classrooms for drawing and present handworks.
- 60.24% stated that walls are not used as educational means to improve child's creativity.

Bases and criteria of classrooms interior design to cope with new educational system and students learning styles

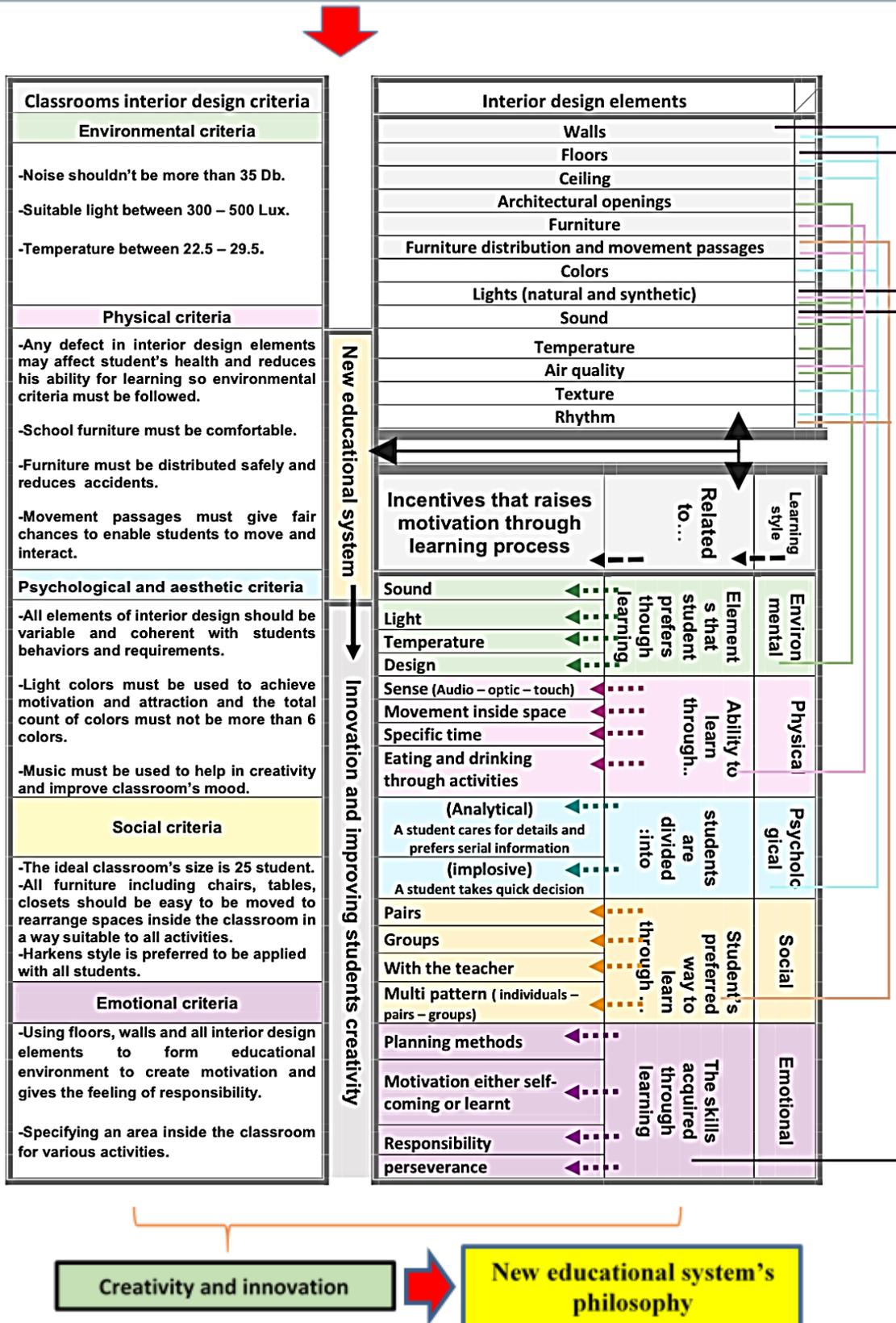


Table (7): shows merging between classrooms interior design elements and students learning styles according to the new educational system.

Results:

1- The harmony between interior design elements and students learning styles such as environmental, physical, psychological, aesthetic and emotional criteria can enhance thinking and creativity

2- Through field study and questionnaire responses we found that the current classrooms for the first and second primary grades in Egyptian governmental schools block applying the new educational system effectively and the results shown as below:

- About half of the researched stated that the class is not considered a suitable learning environment for the new educational system.
- 74.70% of the researched stated that classroom's area is not fit to number of students as the number of students is more than 40 per one classroom and sometimes becomes 60 that blocks any activity.
- Furniture design and distribution are not comfortable nor flexible and not suitable to students' activities inside the classroom.
- 68.67% of the researched stated that the noise coming from outside the classroom is loud and blocks concentration and also about half of them agreed that there is no means to prevent the problems of direct sunlight.
- More than half of the researched agreed that walls and floors are not used as interactive education means for developing students' creativity inside the classroom.

Recommendations:

The researcher recommends the following:

- There must be an interest in applied researches in class design in the field of primary schools by the educational buildings authority due to its importance in forming child's character.
- Interior designs must be used to find nontraditional solutions to solve the drawbacks in classrooms in a way suitable for each school in order to have an attractive, safe and creative school environment.
- Classrooms must be developed and provided with modern technologies to attract students and fulfill their educational needs.
- Students numbers inside the class must be decreased as the current situation limits the role of interior design in creating a creativity supportive educational environment.

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