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Investigating the Impact of Environmental Factors on Learning and Academic Achievement of Elementary Students: Review

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ABSTRACT

The learning environment dramatically affects the learning outcomes of students. Schools' open space and noise, inappropriate temperature, insufficient light, overcrowded classes, misplaced boards and inappropriate classroom layout all make up factors that could be confounding variables distracting students in class. This study was conducted to examine the Investigating the impact of environmental factors(schools' open space, noise, lighting and painted in educational institutions) on learning and academic achievement of elementary students. Survey of literature data from Iran Medex, Magiran, Iran Journal, SID, PubMed/Medline, Google Scholar, Scopus and ISI Web of Knowledge. Database without language restriction, since 2000 sources, with the MeSH term "Impact of schools' open space and Noise and Lighting and Painted Educational Institutions on Learning and Academic Achievement of Elementary Students". At first, 252 articles were found by searching thoroughly in the databases among which 39 articles were selected according to the medical education experts' advices. Analysis of data extraction and quality evaluation of the Literature were performed independently by two investigators. The results showed that noise in educational institutions has a negative and appropriate coloring, lighting of educational environment and schools' open space has impact on learning and academic achievement of elementary school students. Our results suggest that educational managers of country must consider environmental factors in designing educational environments.

Key Words: Schools' open space, Educational Spaces Painted, Noise and Lighting, Degree of Learning, Students.

INTRODUCTION

The school is a special social space where education, training and personality development of children who are a community's future assets are founded and run by proper training methods, appropriate physical space and favorable psychological environment. Students in the process of socialization require a healthy environment and models so as to increase their performance. Since schools are the first model affecting students' personality, thus physical space of school as one of the important element for learning and education even in social perspective or spatial quality and its impact on students' development, play a major role [1]. All experts of education and educational psychology of teaching and learning agree that effective education depends on having a goal, the appropriateness of the physical and social environment of class, motivation of teachers and students for teaching and learning, the students' cognitive, emotional and motor preparation, sound management of class by teachers, their mastery over the subject, and their passion for their work and the students' progress. The teacher try to create a perfect environment for learning to learn prevent the formation of behavior and nuisance factors [2].Education is a public right that operations related to this important area are considered as responsibilities of society within public and governmental policies. It can be considered as factor of equality and justice, since no society can claim justice and equality without education [3]. Elementary school is the first course of public education where children and enter a new world of education and experience life out of home environment, and they face with social realities. Children and adolescents

understand the concept of social role, responsibility, work and social relationships in this way and shape their personality with these experiences and perceptions [4].Studies have also shown that there is a relationship between academic achievement and mental health [5-6].

One of the influential factors in new education is the architecture of educational spaces. In new education, school's physical space is not a dull and boring environment, and it plays a key role in quality of educational activities of students, as dynamic and living factor. In fact, in science communication, education is considered as a kind of providing information. In this view, student education not only is influenced by teacher speech, but also numerous other elements are involved in the transmission of the message to him. According to education experts, in a systematic perspective, school architecture and its constituent elements such as color, light, sound, equipment, etc. as well as other factors can have significant impacts on learners and students. On the other hand, color as the key effect of education spaces can be effective in internal efficiency of students. In fact, color as an integral element of architecture has great impact on the morale and behavior of users of buildings affecting strongly their mental and emotional states; in addition, it has been proved that light and colors affect organism of students in terms of visual and non-visual ways [3,7-9]. In recent years, the curriculum and textbooks has been considered, but this principle, the physical characteristics of educational environment and its impact on students' performance and spirit have not been investigated so much and only a few of studies have been carried out in this regard. Theoretically, paying attention to environmental factors affecting the educational environments and foresight on supplying facilities and needs of educational spaces not only help managers and planners in adopting right and realistic decisions, but also they are necessity of any kind of educational planning [3]. On the other hand, in applied area, understanding environmental factors affecting the educational process and considering them in planning increases mental health of students and reduces their stress, resulting in enhanced educational performance. The aim of this study was to investigating the impact of environmental factors (schools' open space, noise, lighting and painted in educational institutions) on learning and academic achievement of elementary students.

MATERIALS AND METHODS

Survey of literature data from Iran Medex, Magiran, Iran Journal, SID, PubMed / Medline, Google Scholar, Scopus and ISI Web of Knowledge. Database without language restriction, since 2000 sources, with the MeSH term "Impact of schools' open space and Noise and Lighting and Painted Educational Institutions on Learning and Academic Achievement of Elementary Students". At first, 252 articles were found by searching thoroughly in the databases among which 39 articles were selected according to the medical education experts' advices. Analysis of data extraction and quality evaluation of the Literature were performed independently by two investigators.

RESULTS

Color

The effects of exposing people to particular colors have always intrigued scientists. Colors most certainly affect our experience of the world. For instance, an ongoing debate concerns the peculiarly named color "baker-miller pink", which is purported to lower stress and anxiety levels, as well as affecting physiological functions e.g., reducing blood pressure and pulse rate [10-12]. Gilliam and Unruh [13] noted that the results of studies on baker-miller pink were incongruent with each other. Therefore, Gilliam and Unruh[13] investigated the topic themselves, finding no significant differences between people's experience and reactions to ordinary white walls and the more unusual baker-miller pink walls. Elliot et al [14]. Exposed participants to the colors red, green, or black before giving them a test; they found that exposure to red, even if participants were not consciously aware of the exposure, impaired their academic performance. The effect was found even when a number was written in red ink at the top of a sheet of paper. Greater right frontal hemisphere EEG(Electroencephalogram) activation was found when students were exposed to red, which is consistent with similar findings of greater activation in right frontal relative to the left frontal cortex following exposure to the color red [14].Another argument for the negative effects of the color red pertains to findings by Gimbel [15] and Pile [16], which are summarized in a table as part of their research paper [14]. Notably, these authors suggest that the color green is best for classrooms. Gimbel [15] and Pile's [16] table also suggests which colors might be responsible for specific student behaviors. For example red-alert, increased pulse, activity; green-balance, judgment, arrested movement, stasis. However, in his book on environmental psychology, Gifford [17] argues that performance on math and reading tests did not vary among students who performed in classrooms with different colored walls. In a brief review of how to design effective study environments, Stone [18] highlights the lack of a clear relationship between color and mood (working from the assumption that mood is directly connected to performance). Based on a review of dozens of studies, Stone observes that if any relationship does exist, the most likely associations are red and yellow colors with stimulation and blue and green colors with calming effects. Stone also found out that color did have an impact on qualitatively different tasks (math task versus reading task). The color of the surrounding environment affected performance on more

difficult tasks, i.e., the reading task. A further finding was that the lowest performance on cognitively demanding tasks was in classrooms with red walls [15]. Lewinsky et al in a study entitled Effects of classrooms' architecture on academic performance in view of telic versus paratelic motivation considered the negative impact of noise on student learning in 2015 they concluded that preference for a learning environment that cues a telic motivation state in the students [9].

Gilavand et al: This study was conducted to investigate the impact of educational spaces coloring on learning and academic achievement of elementary school students in the academic year of 2015-2016 in Ahvaz.At a Cross-sectional study, a total of 210 students were selected randomly as sample of study. Cluster sampling was done by appropriate allocation and questionnaires were randomly divided among students. Data collection tools included Hermance's achievement motivation questionnaire and researcher-constructed questionnaire (observation checklist to examine the physical parameters of learning environment coloring) and interviews with students. Data of study were analyzed in SPSS- 21 software. The results showed that appropriate coloring of educational environment has impact on learning and academic achievement of elementary school students in Ahvaz[3].

Noise

Noise is well known to have an impact on human performance. Chiang and Lai [19] investigated and identified some of the negative effects of working in a noisy room, with a focus on young children. They claim that noise influences not only learning outcomes, but also the health of the occupants. In the case of young children, they have not yet developed enough executive skill in activities involving communication channels, like speech comprehension, use of language, and written and oral skills [20]. Therefore, interference profoundly interrupts the process of acquiring those essential capacities in children, and noise is far from the only possible kind of interference. Noise undermines reading, writing and comprehension skills, as well as overall academic performance, as noise makes it hard to focus on the task being performed [18]. Chiang and Lai [19] reviewed previous findings on noise's harmful effect on mental and physical well-being as part of their study. From a plethora of demonstrable effects, the following negative outcomes were reported specifically in the context of a noisy room: getting tired easily, leading to lower efficiency; increased heart rate; dyspepsia; poor appetite; insomnia; headache; tinnitus; and facial pallor Zannin and Zwirtes (2009) carried out a study comparing schools built in 1977–2005 according to three different recommended standard designs for school buildings. Reverberation time, sound insulation coefficients and ambient noise were co-related to international standards. Their research confirms what previous studies have found. Many classrooms are simply not comfortable places to acquire knowledge or to be mentally focused at all time, due to noise interference. Zannin and Zwirtes[19] showed that even following standard best practices for design, the results are sub-optimal for a learning environment. Most importantly, the authors highlight that the relative position of school- yards and recreation spaces is often ill conceived with respect of the rest of the school.

In addition, the architectural design and material choices allow for voice and noise to be carried between two adjoined classrooms and hallways. Noise level is another important issue when looking at how acoustics affects academic performance. No internationally recognized norms on maximum noise levels for classrooms exist, but, for example, Brazil's regulatory body has mandated a maximum of 40 dBA[20]. However, one well- controlled study of classroom noise levels revealed values over 40 dBA for each of five tested classrooms with open and closed windows [20]. In the same study, the authors found that both students and teachers pointed out that noise in the classroom was a major source of disturbance for them. Interviews with 62 teachers and 462 students included questions pertaining to how they evaluated various acoustic aspects of their classrooms. These interviews indicated that bothersome noise came mostly from other classrooms. Presumably, teachers and students in adjoining classrooms spoke too loudly. The study reported that every objectively measured acoustic characteristic of the classrooms (background noise, reverberation time, sound insulation) fell short of Brazil's standards. In yet another study, researchers showed clearly that classrooms were not a productive and comfortable place to acquire knowledge, because of poor acoustics [21]. Zannin et al. [18] and Zannin et al. [18] recently found this pattern of negative effects again. Lewinsky et al. considered the negative impact of noise on student learning in 2015. They concluded that preference for a learning environment that cues a telic motivation state in the students [9].

Gilavand et al: This study was conducted to examine the effect of noise in educational institutions on the academic achievement of elementary school students in the academic year 2015-2016 in Ahvaz.This study is applied and it is survey in terms of the nature of study. The population of the study included all male elementary school students in Ahvaz, of whom 210 students were selected randomly as the sample of the study. Cluster sampling was done by appropriate allocation. Questionnaires were randomly distributed among students. Data collection tools included Hermance's achievement motivation questionnaire and the researcher-constructed questionnaire (observation checklist to examine the physical parameters of noise in educational institutions) and interviews with students. Validity of questionnaires was confirmed by content and construct validity, and the reliability of study was confirmed by Cronbach's alpha. The data of the study were analyzed using descriptive statistics (frequency,

percentage, mean, standard deviation) and inferential statistics (factor analysis, t-test, Kolmogorov - Smirnov test and one-way ANOVA analysis) in SPSS21.The results showed that noise in educational institutions has a negative impact on learning and academic achievement of elementary school students in Ahvaz [7].

Light

Light has always been sacred in the major monotheistic religions of the world. In Zoroastrianism, the interpretation of the universe, the essence of angels, and holiness of fire are all based on light. In Judaism, the first creation of God is light and in Christianity, Jesus Christ, is the God's word and light or the father of lights. Light is also emphasized in Islam so much that there is a surah in holy Quran called Light. In holy Quran, the words light and darkness have been repeated 43 and 23 times respectively [22]. These two words are used eleven times together. The word light has always been used in singular form while the plural form of the word darkness has been used, and their meanings are different in different contexts. For example, sometimes light is used equivalent to the Torah and the Gospel and justice equal to guidance but light and darkness have been used to refer to the sense of vision and blindness. At times, light is equal to the Prophet Muhammad (PBUH), the religion of truth, the right way, and the Quran. Sometimes it is also used to mean reward but at other times it is related to visible light. In some verses it refers to faith and leader and guiding light and darkness is associated with kufr, falsehood and error [23].

There is a power problem in more than six thousand schools in Latin America. The plan of lighting for learning is implemented since 2012 (by the governments of Ibero-America). They bring solar energy to the schools. This plan was carried out in 500 rural training center and these schools are now equipped with solar panels and computer and they have access to the internet. More than a thousand teachers and 20 thousand students have benefited from this plan. In countries where the project of "lighting for learning" has been implemented in rural school, dropout rate has declined considerably. Accordingly, this plan plays an important role in the economic growth of the rural communities by encouraging students to complete their education [24].

Gilavand et al in a study entitled The investigating the Investigating the opinion of elementary students in Ahvaz the impact of lighting of educational spaces on their learning and academic achievement considered that results of this study showed that lighting educational spaces has a significant impact on learning and academic achievement of elementary school students in Ahvaz, Iran [8].

The quality and quantity of light (illumination) undoubtedly influences the perception of comfort in a particular space. Illumination has strong and well-documented effects, but less obvious is the case of light quality [24] undertook a study evaluating how different types of lighting (warm white, cool white, and full-spectrum fluorescent) affect various dependent variables, including: cognitive performance, room attractiveness, judged room size, and pleasure of room. They found no significant differences among all dependent variables with respect to the type of lighting used. The researchers could only conclude that management prefers warm white or cool white over full-spectrum light, chiefly because the first two are less costly to buy and maintain.

A natural assumption might be that more light always creates a better, more positive impression of a classroom's qualities. However, one study clearly shows an upper limit to classroom lighting, above which the lighting has negative effects [21] conducted a study in Brazil comparing luminance in classrooms throughout the course of several days in August 2000. One room was equipped with windows with light shelves; another was not. Classrooms were on the same side of the building, and all other variables were held constant. Interestingly, these studies showed that rooms both with light shelves and without light shelves condition had advantages and disadvantages. In late afternoon, windows with light shelves produced light below prescribed luminance, whereas windows without light shelves created high luminance values throughout the day, which can lead to gradual furniture and fixture damage—and distract students and teachers—as well as increase thermal discomfort. This research shows that even such feature like light shelves might have some drawbacks.

Barrett et al (2015) assessments have been made of 153 classrooms in 27 schools in order to identify the impact of the physical classroom features on the academic progress of the 3766 pupils who occupied each of those specific spaces. This study confirms the utility of the naturalness, individuality and stimulation (or more memorably, SIN) conceptual model as a vehicle to organise and study the full range of sensory impacts experienced by an individual occupying a given space. In this particular case the naturalness design principle accounts for around 50% of the impact on learning, with the other two accounting for roughly a quarter each. Within this structure, seven key design parameters have been identified that together explain 16% of the variation in pupils' academic progress achieved. These are Light, Temperature, Air Quality, Ownership, Flexibility, Complexity and Color. The muted impact of the whole-building level of analysis provides some support for the importance of "inside-out design".

The identification of the impact of the built environment factors on learning progress is a major new finding for schools' research, but also suggests that the scale of the impact of building design on human performance and wellbeing in general can be isolated and that it is non-trivial. It is argued that it makes sense to capitalize on this promising progress and to further develop these concepts and techniques [25].

Mot et al. (2012) light is universally understood as essential to the human condition. Yet light quality varies substantially in nature and in controlled environments leading to questions of which artificial light characteristics facilitate maximum learning. Recent research has examined lighting variables of color temperature, and illumination for affecting sleep, mood, focus, motivation, concentration, and work and school performance. This has resulted in artificial light systems intended to support human beings in their actualization through dynamic lighting technology allowing for different lighting conditions per task. A total of 84 third graders were exposed to either focus (6000K-100fc average maintained) or normal lighting. Focus lighting led to a higher percentage increase in oral reading fluency performance (36%) than did control lighting (17%). No lighting effects were found for motivation or concentration, possibly attributable to the younger age level of respondents as compared with European studies. These findings illuminate the need for further research on artificial light and learning [26].

Ahmadpoor Samaniet al (2012) the purpose of this study is to identify the influence of indoor lighting on students' learning performance within learning environments from knowledge internalization perspective. This study is a comprehensive review of literatures base on the influence of indoor lighting on people's productivity and performance especially students' learning performance. The result that comes from this study shows that it is essential to improve lighting in learning environments to enhance students' learning performance and also motivate them to learn more. In this study the researchers utilized Pulay (2010) survey and measured the influence of lighting on students' learning performance. Utilizing survey data collected from 150 students from Alpha course in Malaysia. This study found significant impact between lighting quality and students' learning performance this finding is also supported by interview from two experts [27].

SafakYacan (2014) the focus of this study is the element of daylight in preschools and its social and cognitive effects on preschoolers. The current study is a correlational study that assesses infants' social and cognitive developments, and daylight in preschool classrooms. Participants were 69 children (30 boys and 39 girls), aged from four to five, who enrolled in two different early childhood facilities in Van in Turkey. It was hypothesized that preschoolers' social and cognitive skills would be correlated with daylight in preschool classrooms. Results revealed that there was a crucial correlation between preschool students' social behavior and cognitive skills and daylight in preschool classrooms. It was also hypothesized that there would be a correlation between classrooms' daylight conditions and students' social competence in preschools. The results showed that there was a significant correlation between students' social behaviors and preschools' classrooms daylight conditions. Furthermore, students' cognitive skills were also crucially correlated with classrooms' daylight conditions in preschools. However, there was not an association between boys and girls regarding social behavior and cognitive skills. Additionally, children's social competences and cognitive behaviors did not significantly differ by age. Also, limitations of the current study and further considerations are discussed [28].

Boray et al: Fluorescent illumination has become common, but its alleged effects on behavior are still controversial. This experiment was designed to determine whether warm white, cool white, and full-spectrum fluorescent spectra at approximately equal illuminances differentially affect performance on simple verbal and quantitative tasks, salary recommendations, rated attractiveness and friendliness of others, judged room attractiveness, estimated room size, and self-reported pleasure and arousal. The results showed no significant differences among the three lighting types on any of the dependent measures. A subsequent power analysis indicated that if differences actually do exist, they are quite small. Cool white or warm white lamps are recommended because they are much less expensive than full-spectrum lamps [29].

Schools' open space

Ahmadi Afusi et al: This study overviews literature review and necessity to making happy environment at schools so as to investigate research questions, using descriptive survey method. According to results, in viewpoint of education personnel and girl students, education facilities centered at designing open spaces within schools have the most effect on making happy environment at schools. Hence, proposing do's and don'ts in designing school environment given the existing limitations and facilities to modify improper approaches and move towards optimal approach to make happy environment are all main achievement in this study [1].

Malone et al.: This article examines school grounds as sites for play and environmental learning. It is based on a three-year project that involved 50 eight- to ten-year-old children at five Australian primary schools. Data collection occurred through multiple methods, including behavior mapping of children's play, interviews with children and

teachers, and analysis of children's drawings of their school grounds. The findings show large variations between the schools, particularly in the types of play and environmental learning in which children engage. These variations are related to variations in the physical qualities of the school ground. However, we also found that school philosophies concerning the use and management of the outdoor school environment are equally or more important [30].

Barros et al: Recess provides one of the few opportunities for children to engage in free play and physical activity at school and to potentially be outdoors. Barros and colleagues investigated the amount of recess 8- to 9-year-old children have in the U.S. and compared the classroom behavior of children who receive and do not receive daily recess. The researchers analyzed data from a nationally representative sample of over 10,000 third-grade children in public and private schools. As part of this study, a wide range of data was collected, including interviews with children and surveys of teachers, parents, and school administrators. In analyzing the data, Barros and colleagues found that 30% of children had no recess at all or less than a 15 minute daily break. The researchers found that children with less than 15 minutes of recess a day were significantly more likely to be black or Hispanic, live in a large- or medium-sized city, live in the South, attend public school, and come from families with lower income and less parental education. In examining school behavior, Barros and colleagues found that teachers' rating of overall classroom behavior was better for children with some recess as compared to those with none/minimal break, however, the frequency and amount of recess was not significant. While data from teachers could be biased due to their feelings about recess, this study provides valuable information about the amount of recess 8- to 9-year-old children receive and relationships to classroom behavior [31].

Dyment: This report by Janet E. Dyment presents findings from her 2003 study on the impacts of green school ground initiatives at 45 elementary, middle, and high schools in the Toronto District School Board. As part of this study, Dyment surveyed nearly 150 parents, teachers, and principals about the impact of greening initiatives on a variety of outcomes, including curriculum delivery, student learning and academic achievement, teaching practices, and student behavior. The author also conducted in-depth interviews with 21 respondents from 5 schools. Despite the variety of schools studied, Dyment found a number of common benefits of greening initiatives. For example, 90% of respondents reported that student enthusiasm and engagement in learning increased on green school grounds as compared to teaching indoors and 70% of respondents reported that their motivation for teaching increased on green school grounds as compared to teaching indoors. Dyment also questioned participants about key challenges and opportunities for improvement with regard to green school ground initiatives. Commonly identified barriers included availability of funding and adequate logistical support and human resources. Respondents also provided a variety of suggestions for improvement, including professional development and training opportunities, assistance with physical design, and additional funding support for construction and maintenance. Importantly, this study demonstrates that the benefits of school ground greening initiatives are numerous and varied, and can be realized by different schools with a variety of different types of greening projects. Dyment concludes the report by providing a series of high-level policy recommendations to assist schools across Ontario in successfully implementing and realizing the full benefits of school ground greening initiatives [32].

Blair: Gardening takes place in many schools throughout the nation. Blair reviews research in the U.S. on school gardening and its relationship to children's learning and behavior. She begins her review by highlighting the range of reasons why school gardens exist, which include providing children experiences with natural ecosystems, enhancing children's understanding of food systems, helping children develop environmental attitudes and behaviors, and serving as a basis for experiential learning. Blair then reviews quantitative and qualitative studies on the impact of school gardening on children's learning and behavior. Of the 12 quantitative studies reviewed, she found that 9 of the 12 studies found significant and positive impacts of gardening with regard to test measures, which included children's science achievement and food consumption behavior. Of the 7 qualitative studies reviewed, Blair found a number of commonalities among study findings, including that students enjoyed and were highly motivated by gardening; students demonstrated improved school attitude and pride in the garden; and gardening enhanced student bonding, teamwork, and learning opportunities. In addition, she reviewed studies that evaluated principals' and teachers' opinions about school gardens. Based on her review of the literature, Blair determined that, overall, current research indicates that gardening can have a positive impact on student achievement and behavior [33].

Dyment et al: In recent years, there has been increasing interest in greening school grounds to diversify children's play experiences, such as through the planting of trees, building of ponds, and development of vegetable gardens. Dyment and Bell investigated how green school grounds affect the physical activity of elementary school children by sending questionnaires to a diversity of Canadian schools that had greened their school grounds. Questionnaires were completed by 105 individuals from 59 schools who had been involved in their school's greening project. In analyzing the study data, Dyment and Bell found that green areas were an important place for physical activity: respondents reported that 66% of students use green areas for active play. Interestingly, the researchers found that

green areas tended to support more moderate and light activity as opposed to the more vigorous activity that generally takes place in traditional turf and asphalt areas. Dyment and Bell found that nearly 50% of the respondents reported that their school ground promotes more vigorous activity after greening, while about 70% reported more moderate and/or light physical activity taking place after greening. In addition, the researchers found that 90% of respondents reported that their school ground appeals to a wider variety of student interests after greening; 85% reported that their school ground now supports a wider variety of play activities; and 84% reported that since greening, their school ground encourages more exploration of the natural world. While this study may be limited due to its reliance on retrospective self-report, it provides important insight into the benefits of green school grounds and their potentially significant role in complementing more traditional school ground areas and improving the quality and quality of elementary school children's physical activity [34].

Muñoz: In this report, Muñoz reviews literature concerning the linkage between spending time outdoors and health, with a primary emphasis on research related to children. She reviews research and policy related to outdoor use and health more generally and then takes an in-depth look at topics related to children's use of the outdoors and relationships to their health. Specific topics Muñoz examines include research linking children's time spent outdoors to increased physical activity, healthy development, and overall well-being. She also examines research related to the design of children's play spaces, access to natural spaces, the use of outdoors in children's education, and research related to people and factors that constrain and enable children's outdoor play. Finally, in concluding her literature review, Muñoz identifies methodological considerations, research gaps, and provides suggestions for advancing knowledge in this area [35].

Lester et al: In this report, Stuart Lester and Martin Maudsley provide an extensive review of the literature related to children's natural play. The authors begin by examining the human relationship with the natural world and the importance of play and direct interaction with the physical environment to children. Lester and Maudsley then review the important opportunities that natural play provides, such as the creation of special places, and the numerous documented and potential benefits of children's play in natural settings, including the development of a sense of self and independence. The authors discuss evidence demonstrating a decline in children's access and opportunities to play in natural spaces and provide a range of suggestions to support children's opportunities to play in natural settings, such as through the design of effective playgrounds, school grounds, and environmental play projects, as well as ensuring adequate access to parks and nature reserves [36].

Dan Daviesa: This paper reports on a systematic review of 210 pieces of educational research, policy and professional literature relating to creative environments for learning in schools, commissioned by Learning and Teaching Scotland (LTS). Despite the volume of academic literature in this field, the team of six reviewers found comparatively few empirical studies published in the period 2005–2011 providing findings addressing the review objectives. There was, however a reasonable weight of research evidence to support the importance of the following factors in supporting creative skills development in children and young people: flexible use of space and time; availability of appropriate materials; working outside the classroom/school; 'playful' or 'games-bases' approaches with a degree of learner autonomy; respectful relationships between teachers and learners; opportunities for peer collaboration; partnerships with outside agencies; awareness of learners' needs; and nonprescriptive planning. The review also found evidence for impact of creative environments on pupil attainment and the development of teacher professionalism. LTS intend to use the review as a basis for recommendations to Scottish schools in promoting creativity within Curriculum for Excellence. However, the findings of the review and methodological gaps in the reviewed studies have implications for policy, practice and research internationally [37].

Gilavand et al: This study was conducted to investigating the impact of schools' open space on learning and educational achievement of elementary students in year of 2015-2016 in Ahvaz, Southwest of Iran. At a Cross-sectional study, a total of 210 students were selected randomly as sample of study. Cluster sampling was done by appropriate allocation and questionnaires were randomly divided among students. Data collection tools included Hermance's achievement motivation questionnaire and researcher-constructed questionnaire (observation checklist to examine the physical parameters of learning Schools' open space) and interviews with students. Data of study were analyzed in SPSS- 21 software. Results of this study showed that Schools' Open Space has a significant impact on learning and academic achievement of elementary school students in Ahvaz [38].

Bazzar Chamazkoti in a study entitled role of educational environment on students achievement of elementary school girl Sari city in Iran 2014 have studied concerning to impact of schools' open space on learning and educational achievement of elementary students [39].

DISCUSSION

The results showed that environmental factors (noise in educational institutions has a negative and appropriate coloring ,lighting of educational environment and schools' open space) has impact on learning and academic achievement of elementary school students.

Color of spaces and educational facilities is very important in schools due to age and physical condition of children and adolescents, because issue is effective in vitality, mental peace, mobility and efforts of students, improving the learning process. On other hand, it can result in boredom, inaction, anger, anxiety and depression. In fact, one of the most important places that it must be viewed from different angle is educational space of schools, especially elementary schools as memory construction process begins since childhood. However, a serious shortcoming can be seen in this regard, unfortunately. Regardless of a few exceptions, it has not been considered at al. At most, our schools pay attention to safety and engineering, but the art and psychology experts who have valuable experience in this field are not allowed to provide consulting and implementation in our educational spaces. Due to fact that our children at all ages make relationships with the colors and begin to visualize, the beginning of memory construction by colors is shaped since their infancy. The first babies' encounter with world is done through colors. Therefore, to make this encounter pleasant requires cheerful colors. That is why many manufacturers of toys and children's vehicles show great attention to this issue nowadays, because the initial experiences of child with colors has profound effect on his mind and it can provide valuable storage for later years.

Professional promotion of teachers and students is one of the most important factors examined in evaluating specific characteristics of the performance of any educational institution and its realization creates better results in outcomes of the system. In recent years, curricula and textbooks have been thoroughly considered, but this principle, the physical characteristics of educational environment and its impact on students' performance and mood have not been investigated significantly. Theoretically, paying attention to environmental factors of the educational environments and foresight on supplying facilities and needs of educational spaces not only help managers and planners in adopting right and realistic decisions, but also are a necessity of any kind of educational planning. Studies have shown that noise pollution is the main cause of discomfort among teachers and students which appears in the form of discomfort, irritability, lack of concentration, drowsiness, fatigue, depression and headache. In addition, in the long term it can cause cardiovascular, respiratory and gastrointestinal problems. Other studies have shown that noise pollution can cause poor concentration in school, interfering with the conversation, drop off students in the courses and even reducing their grades, especially in math. Some studies have focused on hearing loss and mental disorders among students in relation to noise pollution. Previous studies indicate that more than 60% of acoustic conditions in schools are inappropriate and students are exposed to noises that are greater than the recommended levels, which is caused by the low-quality of the new building materials used in structures having poor insulation, especially those used in class doors and windows, foreign sources of noise and inappropriate material of interior surfaces with regard to the acoustic resonance and its reflection. Because controlling the aggravating factors affecting noise pollution in schools has multiple solutions including an acoustic modification of the internal surfaces of structures, proper insulation, controlling sounds from mechanical sources and somatic noise sources, identifying and implementing solutions should be in a way not interfering with normal activity and the comfort people requires detailed and purposeful studies. Analyses and calculations have shown that the best way to control noise is based on the modified acoustic structures for schools. Studies have shown that most educational spaces in our new schools, especially in remote and disadvantaged areas are not compatible with psychotic features of children and adolescents. Therefore, it is necessary to exert modifications in this regard. Physical variables, even if they have no impact on students' academic achievement, should be taken into consideration for maintaining health care and mental health and safety.

If seeing action faces with problem, learning will reduce. The purpose of school lighting is to create an environment in which the act of seeing is done in best way with minimal discomfort and effort so that energy of students to be spent on information and learning process, rather than to combat with seeing problems. It should be reminded that in doing any activity, the required amount of light is different. Class lighting is provided through natural light (windows, valves) or artificial light (lamps and lights). In any case, the amount, direction and quality of light must be considered. Numerous experiments have shown that the area of the glassy windows must be at least one-fifth of room surface so that minimum lightening to be provided for reading and writing. On the other hand, any action that would equalize lightening for all students should not be ignored. The light must be desirable in terms of distribution and it should be distributed uniformly so that does not cause eye discomfort. In addition, amount of light should be sufficient and annoying shadows should be avoided. In this regard, Noifert states: "The direct and bubbled fluorescent light is very normal producing proper for blackboard. In America, the artificial lighting is automatically controlled by photoelectric cells". Studied the effect of class light on stress hormones, class performance, body growth and health of 88 students aged eight to nine for one year. The results showed that stress hormones increased in summer and shortage of natural and artificial light caused a significant delay in the increase of stress hormones.

The presence time of students in school yard shows that most of primary school children spend time in school yard, 15 to 30 minutes before beginning class, 30 minutes for break and 30 to 45 minutes for lunch. In other words, they spend 1.5 hours per day or 20% to 25% of their presence in school attending in the yard and at the end of secondary school, the students has spent around 1800 hours, 257 days, just in the yard. For most kids, a time spent in the school yard is the time of game and communication and learning social and physical skills. In fact, most of informal learnings of social skills and constructive plays occur in school yards and play-fields where children spend much of their non-official time of teaching. Several studies show that 2 to 42 percent of children's outdoor activities are done in the play-fields and other 9 percent also in the school yard. A study that shows the play-fields and school yards are not of high status in children's drawings, has estimated the importance of these situations in terms of children less than real. In the process of school reform, school yards still are not considered. Many of them are what is referred as "the play-fields in the prison yard" that includes a rough surface or asphalt with a fence of chain.

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