



Factors Influencing the Development of Educational and Sport Places in Physical Education Schools

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ABSTRACT

Physical education schools play an important role in the physical and mental progress of students as well as having a great impact on the international success of the athletes. Therefore, the architecture and educational sport settings are of high importance. Hence, the present study was carried out with the aim of developing the educational and sport spaces of physical education schools. The current research is phenomenological based on a qualitative method. The research population consisted of academic faculty members of the art and architecture departments, sport management department; experts of constructing and equipping sport places; physical education school principals, teachers, and students. Fifteen participants were selected through a purposeful sampling. The Data collection tool was a semi-structured interview and for the final validation, the validity and reliability criteria were applied. Factors affecting the development of educational and sport places of physical education schools included 68 sub-themes classified under nine main themes: spatial diversity, space function improvement, linkage of the places, light-related factors, color-related factors, design standards, design enhancement, safety factors, and health factors. Therefore, it is essential for relevant managers to take into account the standards of construction and design of physical education schools.

Introduction

Nowadays, sport is one of the most important indications of real development and progress in different countries, which is considered to be as one of the significant factors in improving the mental health of families in the society (Mikkelsen, Stojanovska, Polenakovic, Bosevski, & Apostolopoulos,

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2017). Today, the role of exercise in the physical and mental health of the general public is evident for everyone, especially in today's mechanical life where most people are physically inactive and suffering from sedentary life style. Apropos of this matter, implementing physical training programs also requires providing a set of requirements and facilities, the most important of which include sport places, spaces and equipment designed on the basis of international norms and regulations approved by sports federations for each field. One of the productive factors in the quality improvement of sport activities is the places dedicated to them; and the lack and deficiency of these places and spaces are the elements that slow down the progress of the athletes and results in their failure in various national and international levels (Fallah, Tayebi, & Ghorbani, 2020).

Sport is essentially considered as a classified environment to which children and teenagers, according to their age group, devote more motivation, time, energy and concentration than the other environments (Rodriguez-Ayllon et al., 2019). There are various opportunities in sports for children and teenagers to develop their personal and interpersonal skills and engage in physical activity to enjoy necessary mobility (Bedard, Hanna, & Cairney, 2020).

Physical education in schools, as a pivotal source of positive alterations during various periods of life, including childhood, maturity and adulthood, can improve the general condition of people and create a lifelong learning and improving process (Opstoel et al., 2020). Participating students in sports reach a favorable level in terms of health and quality of life, and have better mental and psychological conditions as compared to their coevals (Syrmpas, Kolovelonis, & Goudas, 2020). Physical activity of children and adolescents has become a key subject in the research relating to physical education, sports and health in the last decade. In this regard, physical education in schools has also been considered as a very remarkable issue by educational officials and planners (D'Elia, 2020). Substantially, sport activities and generally physical education in schools have an effective role in mobility and preventing inactivity and sedentary of children and adolescents. One of the most crucial frameworks of physical education course in schools is to promote the motivation or enthuse children and teenagers to perform various physical activities outside the school environment (Loghmani, Gholidahaneh, & Hassannejad, 2018).

The establishment of any urban element in a specific physical-spatial location of the city is somehow a subject to certain principles, rules and mechanisms, and if considered, will lead to the success and functional efficiency of that element in the same particular place. Delimiting the proper place to establish sport centers is one of the most important tasks and goals undertaken by city managers, which must be prepared in a systematic framework before implementation (Alavi, Ahmad Abadi, Molaei Ghelichi, & Asadi, 2018). Assigning per capita is setting a standard and the first step in normative planning. Per capita is basically a kind of standardized, rule-based, directive, and ethical planning. It is the representative of planning based on judgment and the prediction founded on knowledge, information and experiences, which can determine and predict standard values for short-term programs (Mallaei, Nazari, Vaghar, & Afroozeh, 2020).

Education, essentially has had a distinct place in Iran for an extended period of time; and has its own manifestation and indication according to the cultural and artistic, social and political conditions of each historical era. Physical changes in the schools of historical periods occurred simultaneously as alteration of historical eras, the advancement of architectural techniques and the changes of architectural methods. The educational approach in each era is related to the educational system and the proportionate spaces to it (Behdarvand & Hayaty, 2022).

In this regard, education and, accordingly, educational spaces in every era have enjoyed an important role in growing and developing of societies. Schools are the most well-known educational spaces that have undergone fundamental changes over time in various sectors, including architecture. Therefore, the investigation of these developments during different periods is of notable importance. The current issue of our schools as compared to traditional ones is the lack of spatial quality in their architecture and the substitution of the other elements (Alaghmand, Salehi, & Mozaffar, 2017).

In addition to the issue of sport per capita; there are some other problems in students' use of sport facilities in physical education schools: collaborative use of a sport complex to do different sports with various fields, the existence of the swimming pools and some sport halls outside the premises of physical education schools, archaic constructions and similar constructing design and architecture as compared to ordinary schools, the lack of changing rooms and bathrooms for the use of students

during sport activities, the lack of safety spaces in buildings, sport places and school areas, and other similar cases. In the same vein, this research seeks to identify the effective factors on the development of sport training spaces of physical education schools in order to solve the stated problems and encourage students to do sport activities which provide the ground for their growth and development.

In a study Esmailpour Bariki et al. (2022) with the approach of developing school sports; the policies of educational centers, the standardization of sport structures and the architecture of sport places and spaces were considered influential in the future state of educational sport of the country (Esmailpour Bariki, Shojaei, & Hami, 2022). Zandieh et al. (2019) in an investigation on flexibility methods in updating the architecture and educational approaches of schools; stated: architecture as a leading element in designing can arrange the modeling process from the scratch to the production. The attitude towards architecture, therefore, should be a back-and-forth approach to both the whole and the components simultaneously. School architecture is considered as one of the effective educational and pedagogical parameters in modern education. As thinkers emphasizes on examining educational issues on various factors such as family, teacher, educational management, etc. as effective factors in the learning process; the architecture or the physical space of the school also plays a role as a living and dynamic factor in the quality of the students' educational activities (Zandieh, Hessai, & Zandieh, 2020). In a study entitled the role of aesthetic aspects of sport architecture with an emphasis on communicative approaches in attracting female students to sport places, Hosseini and Tarverdizadeh (2021) stated: "aesthetic dimensions have a positive and meaningful effect on students' orientation towards sport facilities." Therefore, it can be concluded that the sport facilities in educational schools should have the appropriate architecture and the essential standards to ensure the health and safety of the students' physical and mental health (Hosseini & Tarverdizadeh, 2021). Barotiyani et al. (2020) in a research with the content of the influence of the architecture of sport spaces covered by Tehran Municipality on the degree of citizens' inclination towards sport activities declared: the architecture and design of sport facilities are impressive in absorbing and tending citizens to sport activities, and those in charge should specially take into account the architecture of the facilities based on culture, accessibility and other obtained indicators while designing (Barotiyani, Atghia, Kashef, & Hafezy, 2020).

Razavi et al. (2013) stated: The dimensions of color, light, harmony, form, space and environment are efficient in customers' tendency towards sport places (Razavi, Hosseini, & Soleimani, 2013). Mallaei et al. (2020) in the discussion of sport spaces per capita in general stated; Guilan province, like other provinces of the country, has confronted extremely high shortage and has a significant difference with the country's standard per capita index (Mallaei et al., 2020). Therefore, the per capita amount of sport spaces in Gilan province does not thoroughly match the defined standards. Although the relative status of per capita in some regions is better than the others, the sport per capita of all regions is lower than the standard. Subsequently, per capita amendment approaches are required to solve these deficiencies. Shamaeva and Zinkevich (2022) declared; Sport places should have a variety of facades and colorful designs, and somehow enjoy unique visual contexts (Shamaeva & Zinkevich, 2022).

Baek (2023) stated: Pundits should focus on expert advice in designing schools (Baek, 2023). Elgammal and Abdel-Razek (2022) affirmed: The development of sport fields and the progress of athletes in recent years requires a transformation in the design and architecture of sport facilities to satisfy the needs of athletes (Elgammal & Abdel-Razek, 2022). Al et al. (2012) stated: Principally, the design criteria for educational constructions such as schools have an impact on learning and boosting students' motivation (Al et al., 2012). İslamoğlu (2018) remarked: Connection between internal and external spaces is of high importance in designing schools, so that school campus and classrooms are designed as flexible multi-purpose spaces depending on the basic principles of freedom and sociability, and natural light (İslamoğlu, 2018). Brittin et al. (2015) stated: In designing school architecture for students' physical activity; some factors ought to be regarded such as: the presence of natural elements inside and around the school, spatial patterns, the orientation of the building for natural light penetration, the function and architecture of the building to encourage to walking, enough space for each student, consideration of separating the gym space from the classrooms, flexible classrooms, color lines to detach the game areas, diversifying the views and other things (Brittin et al., 2015).

Hudec and Rollová (2016) stated: the use of sustainability strategies and architectural solutions can respond favorably to the required changes of the buildings over time in accordance with the current needs of the owners and users of the construction, and in this regard, new spatial and structural strategies and new designing programs in sport architecture are productive (Hudec & Rollová, 2016). Chen (2014) said: the use of information technology and smart technologies, harmony with nature, attention to environmental issues and sustainable development are substantial features in the architectural design of sport places (Chen, 2014).

Unfortunately, the physical education schools constructed in Iran do not benefit from good architecture, and the lack of educational and sports spaces in these schools, as well as the lack of proper infrastructure, have caused many problems. Also, the atmosphere of most physical education schools is teacher-centered, instead of student-centered. Paying attention to spatial quality and improving social relations in the school environment are also important factors in the architecture of physical education schools. The review of past researches showed that so far no research has been done in this field in Iran, and the current research is looking for solutions to develop the architecture of physical education schools in order to solve the existing challenges. According to the mentioned cases, the main question of the research is as follows:

What factors results in the development of educational-sport spaces in physical education schools?

Methodology

The current research is practical in terms of purpose and was approach based on a qualitative method. The goal of this study was to survey the effective factors on the development of the educational and sport spaces of physical education schools based on the related experiences of people to the subject via a phenomenological method, and the Colaizzi method (1978) was applied to analyze the data of the interview. This study was conducted in 2023.

The statistical population of the research consisted of academic faculty members of the art and architecture departments, sport management department; experts of constructing and equipping sport places; physical education school principals, teachers, and students. In the end, 15 people were selected through a purposeful sampling. In the process of selecting the participants, the scientific experiences of whom, the complete satisfaction of people in attending the interview and their ability to conduct the interview as well as recounting the contents; were considered as the criteria for entering and selecting the participants in the research. The criteria for excluding participants from the research was the lack of sufficient will to keep on working with the researcher and insufficient information on the intended research field.

The Data collection tool of the interview was semi-structured interview with the duration between 30 to 40 minutes for each. The interviews continued in a semi-structured manner as long as it was possible to extract completely non-repetitive concepts from them (15 interviews). The interviews started with a question-oriented design.

1. According to your experience, what factors results in the development of educational and sport spaces in physical education schools?

According to the use of Colaizzi method in the research, 7 approaches thereof were applied. Colaizzi method includes seven stages including: 1) a detailed study of all the important descriptions and findings of the interviewees, 2) extraction of effective phrases and sentences relating to the desired phenomenon, 3) assigning meaning to the important phrases and sentences extracted from the interview, 4) sorting ,ordering and arranging the descriptions of the interviewees and common concepts in specific categories, 5) turning all the extracted opinions into complete descriptions, 6) converting the comprehensive descriptions of the phenomenon into an abbreviated true description, and 7) final validation (Colaizzi, 1978). Finally, all the interviews were investigated several times and the resulting content was written literally. Subsequently, the desired steps of the study were carried out in the order of execution in the Colaizzi method.

In the following, due to the semi-structured nature of the interviews, the rest of the questions were asked from the research participants according to the interview process. In this regard, the validity and reliability criteria were applied for the final validation of the research. For this purpose, the interviews were given to the interviewees after being analyzed, their opinions thereof were applied

and the necessary corrections were made. In order to check the reliability, the intra-subject agreement method was used. Two experts in encoding, familiar with the coding method and the topic related to the current study, coded the interviews, by which the percentage of agreement between the two coders equaled 88%.

Results

Table 1 is the presentation of the demographic information of the interviewees. Table 2 demonstrates the factors affecting the development of educational and sport spaces in physical education schools. By analyzing the information obtained from the participants in the research, factors affecting the development of educational and sport places of physical education schools entail 68 sub-themes presented as 9 main themes: spatial diversity, place function improvement, linkage of spaces, light-related factors, color-related factors, design standards, design development, safety and health factors. Figure 1 shows the final pattern resulting from the research findings.

Table 1. is the presentation of the demographic information of the interviewees.

Number	Gender	Specialty
1	Male	Faculty member of the Art and Architecture Department
2	Male	Faculty member of the Art and Architecture Department
3	Male	Faculty member of the Art and Architecture Department
4	Male	Faculty member of the Art and Architecture Department
5	Female	Faculty member of the Art and Architecture Department
6	Male	Faculty member of Sport Management Department
7	Male	Faculty member of Sport Management Department
8	Female	Faculty member of Sport Management Department
9	Male	Active in the field of construction and equipping of sport facilities
10	Male	Active in the field of construction and equipping of sport facilities
11	Male	Principal of physical education school
12	Male	Principal of physical education school
13	Male	Teacher of physical education school
14	Female	Teacher of physical education school
15	Male	Physical education student

Table 2. Factors affecting the development of educational and sport spaces in physical education schools.

The Major Content	The Minor Content
Spatial diversity	1. Considering the flexibility of spaces for possible changes in the future
	2. Definition of multifunctional spaces
	3. Visual linkage between spaces
	4. Defining spaces for individual and group sitting
	5. Buffet connection to nature with internal and external access
	6. The existence of space positioning solutions
	7. Considering space fluidity
	8. Emptying the space along corridors and entrance of light
	9. Connection between interior and exterior environment

Enhancing the Function of spaces	<ul style="list-style-type: none"> 10. Form and shape proportion with space with function 11. Combining classes with larger common spaces for group work 12. Enlivening communicative paths and transitional spaces 13. No direct view from the classrooms to the sport fields 14. Land separation lines with new fading technologies 15. The entrance of the school building with an absorbing feeling 16. Increasing sport per capita of schools in Iranian
Connections of spaces	<ul style="list-style-type: none"> 17. Plan zoning 18. The design of the roofed sports field one floor lower than the ground floor 19. Designing classrooms above the ground floor 20. Placement of the changing room in connection with the gym on the ground floor 21. Construction of toilets next to the escape stairs and to the school authorities' visibility
Light-related Factors	<ul style="list-style-type: none"> 22. Maximum use of sunlight 23. Considering the north and south light in constructing the classroom 24. Level distribution of light in ceiling skylights 25. Prevention from direct light to the classrooms and gyms 26. Lack of transparent and polished surfaces 27. Receiving light from ceiling with protrusions in the lay out 28. More light absorption with protrusions and depressions in the cutting
Color-related Factors	<ul style="list-style-type: none"> 29. Using cool and calm colors in corridors and stairs 30. Using white and bright colors in the facade of the construction 31. Using the right color in the flooring of sports halls
Designing criteria	<ul style="list-style-type: none"> 32. Designing schools with only one main entrance 33. Designing 0.5 meters of green space for each student 34. Designing windows on either side of the classroom with more than 7.20 meters in width 35. Designing escape stairs for every 6 classes 36. Designing theory classes in square-rectangular shapes 37. Considering standard per capita 38. Locating classes in the quietest place 39. Enclosing the playground at a height of at least 3 meters 40. Placing the entrance door of the class near the board 41. The maximum classroom size of 7*8 meters 42. The direction of opening the doors of educational spaces for more than 8 people to the outside 43. Non-disturbance of the doors while opening in plan retreating 44. Considering the privacy of the neighbors around the site 45. The minimum height of roofed sport complexes is 7 meters 46. Separation of students' entrance to school with car entrance 47. Designing amphitheater with two internal and external entrance doors 48. The trait of being acoustic for theory classes
Design Development	<ul style="list-style-type: none"> 49. Starting to design from the circuit space and arrange the pieces around this area 50. Converting corridor system into pool or combined system 51. A student-centered school instead of a teacher-centered one 52. More allotment to the design of the lobby as the heart of the complex 53. Input filter 54. Use of pilot in northern cities
Safety Factors	<ul style="list-style-type: none"> 55. The smoothness of the surface of sport fields 56. Using suitable flooring in sport places 57. Separating sport fields from other fields 58. Absence of uncovered water hole 59. No seams and cracks in the sport field 60. Improving the quality of sport flooring 61. Protection for windows 62. standardized sports equipment

	63. Assigning a room to deal with possible injuries at school
	64. Using protection on the walls around the gym
	65. Installation of signs in places such as toilets, bathrooms, changing rooms, conference hall
Health Factors	66. Enough toilets and bathrooms
	67. Considering health principles for sport complexes and equipment
	68. Assigning a space to install a first aid box and sanitary supplies

Figure 1 shows the final model resulting from the research findings.

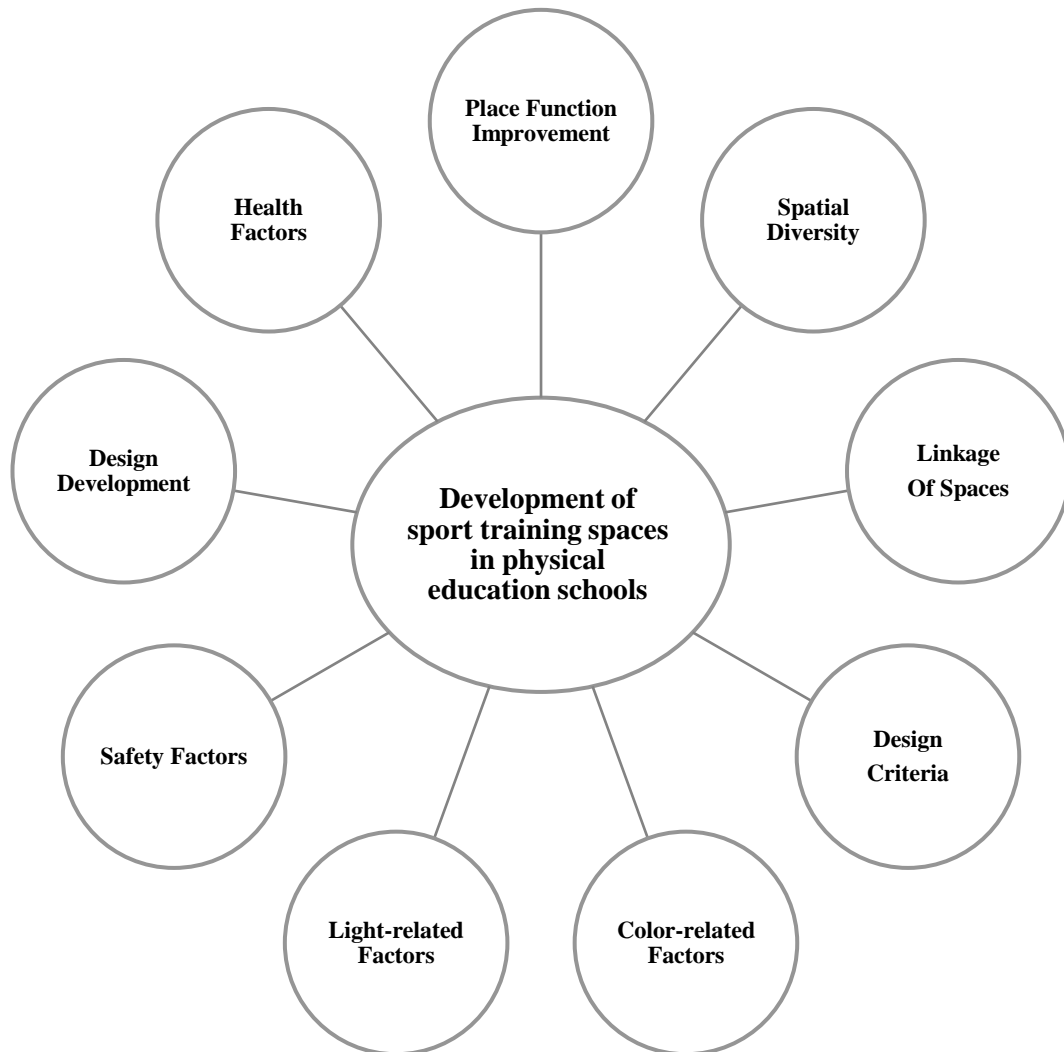


Figure 1. The Final Research Model

Discussion and Conclusion

According to the mentioned cases, it can be said that physical education schools play an important role in the students' physical and mental growth and progression. Hence, more attention should be paid to the sport training spaces of these schools. By the use of this approach, the present research identified the factors of developing educational and sport spaces of physical education schools.

The first recognized content is spatial diversity. Physical education school as a space for educating, should be extensive with increased social interactions and encourage students to exercise by raising the level of motivation; and this can be achieved through spatial diversity. One of the most important contents identified in this section is the fluidity of space; by creating wider spaces with less angled-lines, the atmosphere of the environment lightens and the convenience is improved and it creates an

interactive environment through establishing communication between the inside and the outside of the school; and by defining multi-functional spaces with flexibility, spatial diversity can be ameliorated. With regard to the flexibility of spaces for possible changes in the futures; visual linkage between spaces and space fluidity are among the most important factors identified in this section.

The second identified content is developing the functions of spaces. In Iran, less attention has been paid to the school, especially the physical education school, which is a space for revealing talent, therefore, it is recommended to improve these spaces by increasing sport per capita and represent form-spatial solutions that are subject to performance. The concepts specified in this section are effective in solving the stated problems. Exciting communicative paths and transitional spaces, no direct view from the classrooms to the sport fields, land separation lines with new fading technologies, engrossing school instruction entrance, are among the most substantial factors identified in this section.

The next identified content is the connection between spaces. If the space of the physical education school is arranged appropriately according to the needs of the students, a suitable ground and context for individual and group learning will be provided, for doing so, each zone in the plan of the physical education school is placed in a distinctive part and the zones are not combined together. Designing the roofed sport fields one floor lower than the ground floor, placing the changing room in relation to the gym located on the ground floor, are some of the most predominant factors recognized in this part.

Light-related factors are the next identified content. Visual work is the main activity that takes place in an educational space. Light is the first condition for any kind of visual perception, and spaces with proper lighting increase people's creativity and create a congenial and cheerful atmosphere. The designing of the classrooms should be in a way that receives maximum natural light, and the light should be evenly eradiated in the sport complexes to avoid the glare of the students' eyes. Maximum use of sunlight by regarding the north and south light in constructing the classroom, prevention from direct light to the classrooms and gyms, are of the most notable factors diagnosed in this sector.

Color-related factors are the other recognized contents. One of the ways to optimize physical education schools is the color of their spaces. Basically, bright colors make the space look bigger. The proper color can create a feeling of pleasure and relaxation; improve students' learning; create a delightful and dynamic atmosphere. The opposite aspect of this issue can also be applied in such a way that sometimes even in the staircases using cold colors can help prevent children from running. Using cool and calm colors in corridors and stairs, white and bright colors in the facade of the construction, and the suitable color in the flooring of sport halls, are among the most remarkable factors known in this section.

The sixth identified content is designing criteria. The designing criteria have been determined by the experts in this field and are almost the same all over the world and for all the schools. These criteria should be taken into account in order to design a physical education school with proper performance along with physical and mental comfort. The contents identified in this section help to improve this process. Considering standard per capita, locating classes in the quietest place, heeding the privacy of the neighbors around the site, the acoustic quality of theory classes, are some of the most significant factors spotted in this section.

The next identified content is design development. Designing the school should be started from school campus which is considered as the keystone that organizes the school. The circuit space can be generally defined in three types in the classification of schools, including: 1. Corridor system: an arrangement of spaces with long internal connections, 2. Pond system: a central space where all horizontal and vertical connections take place, and 3. The combined system of a pond and a corridor: which is a combination of the previous two types, that has both a central space for communication and a corridor used to access other spaces. In general, Iran's schools are currently designed as corridor system, where classes are placed around long corridors. These types of schools are called teacher-centered schools in which less attention is paid to the psychological, social and emotional issues of students, and the satisfaction of students is trivial; in this system, students forget quickly what they have learnt. The only purpose of these schools is to pass the exam, but in the pond and combined systems, by assigning the lobby (a wide space) as the heart of the complex and emptying the spaces along the corridors, entering the light, flexibility of the spaces and multi-functional spaces, they can

be turned into a student-centered school where the psychological and social aspects of students are considered significant. Starting to design from the circuit space and arranging the pieces around this area, converting corridor system into pool or combined system, a student-centered school instead of a teacher-centered one, use of pilot in northern cities, are of the most considerable factors identified in this section.

Safety factors are the other identified contents in this research. Since the schools are the second place after home where students spend most of their time; they confront many dangers and accidents. Considering safety factors, especially in physical education schools, where the physical activity of students reaches its peak, should be necessitated. Consequently, by proper constructing of floors and considering school designing criteria, students' safety is highly afforded so that no danger would befall them. Using convenient flooring in sport places and improving the quality of them, standard sport equipment, assigning a room to cope with possible injuries at school, installing signs in places such as toilets, bathrooms, changing rooms, and conference halls, are among the most noteworthy factors specified in this part.

The last content recognized in the research are health factors; and it includes a set of measures taken to ensure and improve the physical and psychological health of students; and some of its approaches are: proper slanting of floors towards the drain which makes it easier to clean the spaces, and separation of the sport field from the school yard to provide the hygiene of the spaces. Sufficient toilets and bathrooms, considering health principles for sport complexes and equipment, assigning a space to install a first aid box and sanitary supplies, are of the most prominent factors identified in this section.

Therefore, in the process of constructing and equipping physical education schools, it is necessary for relevant managers to pay enough attention to the standards of constructing and designing of physical education schools, so by developing education-sport spaces in these schools, we can see the physical and mental students' improvement.

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