Iran’s Activities on Disaster Risk Reduction of Schools

SAFE SCHOOLS FOR ALL

2nd Meeting of Safe School Leaders

TEHRAN 4-5 October 2015

Education Sector Policies and Plans

Pillar 1. Safe Learning Facilities
- Building codes
- Performance standards
- Disaster risk design

Pillar 2. School Disaster Management
- Representative participatory IDOM committee
- Educational continuity plan
- Standard operating procedures
- Contingency planning

Pillar 3. Risk Reduction and Resilience Education
- Sustainable nuclear risk-resistant education
- Informal & community-based education
- Teacher training & staff development

Aligned to national, subnational and local disaster management plans
Necessity of providing safety for schools in Islamic Republic of Iran has received significant attention considering possibility of heavy casualties from disasters during education time, vulnerability of students compared to other population and public grief in case of casualties related to students. On the other hand, students are considered human resources for the future of the society and therefore efforts should be dedicated to providing safety for students in the scope of sustainable development.

Abundance of school buildings (95000 educational buildings) with 13/000/000 Students throughout Iran and having safe school buildings have led to providing families and society with calm spiritual and intellectual atmosphere. Also, in a case of disasters, safe schools can be used as immediate shelters for the affected population.

The aforementioned reasons resulted in cooperation of Iranian government with the parliament, benevolent people and the private sector in the last 12 years. This collaboration includes demolish-reconstruction and seismic retrofit projects, holding training courses and workshops with the aim of disaster management, execution of preparedness maneuvers against earthquakes and also standardization of the equipment and facilities of school buildings.

Iranian Organization for Development, Renovation and Equipping Schools (DRES) as the development department of Ministry of Education has initiated a large effort in these years for realization of the activities related to providing school buildings with safety. These efforts are categorized in three major parts; retrofit and standardization, disaster management and schools preparedness against various hazards and holding training courses for students and teachers with the aim of resilient response against these hazards.

Besides using the public and private sectors sources for development, renovation and equipping Iranin schools, there have been impressive undertakings for gathering the public partnerships and benevolent people’s aid. This has led to major contribution of benevolent people in construction of new school buildings and making the existing school buildings safe throughout Iran. The results of this contribution is improvement of public access to the educational facilities and providing students with the state-of-the-art standards.

In this document, a selection of the undertakings has been presented in three chapters in which information related to each part of schools has been elaborated. Moreover, a summary of activities by benevolent people in the area of construction and safe building of schools are introduced.

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Safe School

Educational centers are one of the vulnerable locations in the case of disaster, thus generating an action plan to decrease losses should be considered as an important goal. Various worldwide initiatives have been taken to make school buildings safer and have disaster risk reduction programs taught in schools. Iran is also one of the most seismically active countries in the world and therefore earthquake which is known as a destructive disaster occurs frequently in this country. In this way children are disproportionately affected by disaster, therefore, mitigation and resilience are vital. It is urgent to plan, anticipate and reduce the losses of disaster in order to protect the children’s lives.

The worldwide initiative of safe school (WISS) was proposed at the third UN World Conference on Disaster Risk Reduction in 2009 for the first time (1418- March 2015, Sendai, Japan). During the conference it was planned that national assessments of the safety of existing education should be undertaken by 2011 and concrete action plan for safer school should be developed and implemented in disaster prone countries by 2015.

• The Global Alliance for Disaster risk reduction and resilience in the education sector defines safe school as a combination of three components as shown below.
• Safe Learning Facilities (disaster-resilient infrastructure)
• School Disaster Management
• Disaster Risk Reduction and Resilience Education [1]

According to definition of the Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector, a school considered as a safe one if it contains three pillars as follows [1]:

• Safe School Facilities
  It means structural safety in construction of schools and retrofitting vulnerable ones. The construction of new schools and retrofitting the old ones should be according to building codes and standards that ensure safety of schools structurally. In other words, the building of schools, facilities used in education center should be considered as an important factor to achieve safe schools.

• School Disaster Management
  This component includes contingency plans, school staff and children preparedness in case of disaster. Training exercises and evacuation drills are some of activities in this area. Preparedness means to be ready to respond to a disaster and manage its consequences through measures taken prior to an event.

  There are four main phases in disaster management that should be considered in study stage: prevention and mitigation, preparedness, response and recovery that are shown below. It is obvious that these phases are highly interconnected; in other words, each one influences the other three phases. The first stage in the emergency management cycle is prevention and mitigation. It involves some kind of actions that omit or decrease the likelihood of a disaster or a crisis in schools. The second phase designs processes to prepare the school staff and children for a potential disaster. Response is considered as the third step in disaster management that is taking action to effectively contain and resolve an emergency that will be enhanced by thorough and effective collaboration during the two previous phases. The last one is recovery that establishes policies and procedure to assist a school staff to return to functioning after a disaster.

• Disaster Risk Reduction and Resilience Education
  This pillar aims to include disaster risk reduction as a part of school curricula and to strengthen teacher education in disaster risk reduction and resilience education. This component should be considered by Ministries of Education in order to improve life-saving skills of pupils and teachers. Resilience is the capacity of a system, community or society to adapt to disturbances resulting from hazards by persevering, recuperating or changing to reach and maintain an acceptable level of functioning that can be built through empowering students and teachers to share responsibility to keep hazards from becoming disasters.
Nowadays, education as a universal social phenomenon is an integral part of social life and nearly all children receive primary school education. Schools and classes are the institutional units necessary to perform the technical functions of the educational system. Classrooms play an important role in children’s learning process and it is essential to identify the factors that create favorable conditions in this space. Accordingly, in educational spaces influential factors are defined as an interconnected structure including: education, human interaction and physical space. Relationship with the teacher, peer relationships, teaching methods and curriculum constitute human factors; whereas light, sound, temperature and ventilation, color, scale, furniture, arrangement, shape and size of the classroom make physical factors; and the strength and safety against natural hazards, reducing vulnerability and enhancing service capabilities, back scalability and resiliency are the main variables of creating a favorable educational environment for children. These factors are associated with each other and influence the main goal of teaching children, i.e. their learning process.

Since the students are influenced by the physical space much more than what the public think, a proper educational space can directly affect their behavior and learning; because in fact, learning in children occurs by means of all senses. Experience has shown that the shortcomings of the physical environment, educational furniture, equipment and deficiency of installations in conformity with the comfort of individuals, safety and climatic conditions in the educational environment and the incompatibility of the education environment with adjacent uses cause educational objectives fail to achieve the desired effect. Consequently, it can be clearly understood that the physical space is anything that affects children mentally and emotionally, through intelligent design of educational environment other than the standard curriculum. The success of the schools in any organizational terms depends on the existence of a proper physical structure and one can even say that the equipment of schools in all physical aspects is one of the most important requirements of formal education.

In order to achieve optimal educational implementation of various educational buildings in accordance with the standards, regulations and relevant national and international codes are binding. For this purpose, twenty issues of national building codes, regulation for designing earthquake resistant buildings (2800 standard), journals related to educational buildings and ACI, AISC, ASCE, ASHTOO,
BS, FEMA, Architectural Graphic Standards, Neufert, Time saver, standards for interior design and space planning are used.

Locating educational spaces: The rapid growth of population and the urban texture create problems such as lack of proper spatial distribution of uses. Meanwhile, the education spaces are among the functions with increasing importance, and due to the young population of Iran, constructing new schools and optimum positioning for the young population are of particular importance.

Compliance with geographical conditions (the construction site): Climate compatibility, harmony with the city, compatibility with the neighborhood and the religion, traditions, customs, culture, and the way people live.

Zoning school uses, taking into account the characteristics of each space: For this purpose, noisy spaces such as gyms, sports grounds and play yards are separated from quiet spaces such as classrooms, libraries, etc.

Appropriate lightening of education spaces: Among all the elements that can enhance the effectiveness of a school, none affect the quality of learning as much as daylight. Natural light with good vision prevents a feeling of being imprisoned and finally insecurity in children. Besides, providing enough light in educational spaces is effective in preserving visual health of students. To provide enough light in the educational spaces, in addition to natural light, artificial light is also necessary. Lighting can create diversity in space and light can be used to emphasize the space.

Observing acoustic principles: The need to control noise is among the primary principles of school designing. Analysis of the results showed that the main cause of high noise pollution is the type of materials used in the buildings. Acoustic modification of the building for schools include: increased effective levels of absorption in classrooms through the use of acoustic tiles on the ceiling and leakage control of doors and windows, and educating students by proposed ways to reduce noise pollution for the schools. For schools that will be built in the future, locating and designing based on noise control seems essential.

Spatial diversity by designing open, semi-open and closed spaces: Designing and using open spaces in schools (yard, green space and garden) will contribute to the beauty of the perspective and the original form of the building. Form must be chosen to be compatible with the content and the idea of space. Students need a familiar shape in anything new and these figures help children create for themselves a second home from a strange new environment.

Observing human scale and dimensions with regard to the level of education: Use of appropriate dimensions for educational spaces is very important because it provides the level needed for implementation of educational activities in each space. To achieve appropriate functional space three factors are effective:
1. The human dimensions
2. The dimensions of the furniture
3. Boundaries of behavior and motion

The geotechnical considerations: Designing education spaces shall take place according to geotechnical considerations such as proximity to active faults, slope of the region and geotechnical instability (liquefaction, large settlements, landslides, etc.).

Taking into account the resistance of structural and non-structural elements of the building against various loads: For risk reduction of the structures during earthquakes and other lateral loads, new and improved technologies in design and construction, including seismic separators and light materials are used in order to reduce lateral loads of the earthquake.

Selection and use of appropriate building materials: Construction materials shall comply with the Iranian standards and building codes in terms of quality and durability, technical features and specifications and testing methods. In addition to the above, selection of materials shall be performed by taking...
into consideration the aesthetics, color and texture. In particular, color as the main element in the design of education spaces is of great impact on the morale and students’ behavior in schools. The color of spaces and equipment is very important considering age and physical condition of students. In fact, the use of suitable color could increase freshness and vitality, mental calmness, student’s activity and effort and enhance the learning process. Use of various colors at the entrance of the classrooms and in the hallways can help students distinguish the spaces and make them feel confident. The use of different colors for different classes and doors can also create a sense of spatial identity and devotion to the classrooms.

Attention to sustainable development and energ saving: Saving fuel in educational spaces in order to maintain the national capital and prevent environmental pollution is the main goal. An example of which is the use of renewable energy sources.

Air conditioning: Designing educational buildings shall focus on the greatest amount of natural ventilation. Similar to light, fresh air in the classrooms is very important that could lead to a healthy environment for learning. The amount and quality of the air inside classrooms depends on various factors such as relative humidity, temperature, air compounds and pollutants. It is noteworthy that lack of fresh air inside the educational space can result in diseases and the progression can move toward the crisis as well as decreased learning skills such as memory, concentration and calculation. Researches show that education, safety and beauty of the environment and the amount of air that children breathe affect their learning. Students’ behavior in the classroom is significantly influenced by the temperature and air quality. In this regard, it is important to pay attention to the following:
1. The location and type of the openings
2. Appropriate space orientation to the wind
3. The use of trees and shrubs
4. Choosing appropriate materials (for premises)
5. Selecting appropriate and optimized facility equipment and systems to achieve optimal conditions of temperature, humidity and reduced amount of pollutants

The use of new technologies: Extensive research on optimizing the buildings both in the design, implementation and operation in the world and Iran has been carried out; hence it is essential to take advantage of the research. The smart new equipment is also used to save fuel consistently in order to protect and preserve the environment and national capital. Building and equipping educational spaces in Iran with appropriate quality and according to the regulations and standards is the substantial task of DRES. Thus, controlling the quality, cost and the execution time of the construction projects is the most important operating section of DRES.
With the development of urbanization and conversion of sparsely populated towns to medium-sized cities and finally metropolises, new challenges have arisen in the field of lack of educational spaces in the areas of immigration destination. Displacement of population from one region to another causes the reduction and increase of the student population in those regions. Problems in the areas of urban development such as Mehr housing projects due to the shortage or lack of education centers and on the other hand empty or low populated schools in evacuated regions show lack of a systemized plan for predicting the required educational facilities. Therefore, considering the capabilities of GIS and RS and also utilizing multi-temporal images of the study area, it is possible to provide a growth pattern for a city and also predict areas with more population in the future using the analysis in order to provide the lands in accordance with the locating standards.

By extracting factors which are compatible with the educational space, such as being located near the park, open space, proximity to transit stations and incompatible factors with the educational space such as proximity to power line and gas installations, gas station, proximity to active faults, watercourses, etc and taking advantage of new methods in prioritization and weighting of these factors, a better locating for educational spaces can be performed. As an example, the required map of different zones for optimal locating in Tehran is displayed.
2. Designing educational spaces

The process of doing any projects or new initiatives, based on a process approach and ensuring continuous improvement of the schemes according to the needs of the scheme users are as follows:

1. Initial studies including library and field studies, collecting expert opinions, collecting the needs and expectations of beneficiaries, studying national and foreign samples, preparing a study plan and gathering standards.
2. Preparing the design for the first stage of the preliminary design
3. Performing the second phase of design or detailed design including structural calculations, mechanical and electrical installations and the details of the implementation
4. The implementation of the project by the contractor
5. Supervision over the finished projects
6. Visiting after coming into operation and getting feedback from the beneficiaries

According to the implemented project, it is possible to build schools with various designs, while complying with regional standards and specifications; so as besides maintaining the consistency and integrity of regional context and attention to existing possibilities and limitations, innovative designs using new technologies have been implemented. No doubt, art of architecture is the enduring expression of the culture and civilization of each nation, and educational spaces being among the most important cultural and educational centers throughout history have been considered by talented architects. Creating a resisting, beautiful, safe and vibrant space appropriate for students and teachers, improves the quality of education and introduces schools as the symbol of cultural development, in tune with the culture as well as regional and native specifications of the area. DRES tries to design and implement schools considering the students’ needs and characteristics of their age and gender in accordance with technical, climatic, cultural and historical requirements in order to provide school spaces with identity, dynamic, safety and joy. Given the direct impact of architecture on raising the quality of teaching and learning in the schools, creating designs in the construction of educational spaces using the latest technology and observing points such as beauty, durability, security, relationship between interior spaces with each other and connection from outside to inside of schools, the dimensions of peripheral spaces, climate and culture is essential.

After architectural designing of the building and selecting the type of the structural system, the structural engineer models the building and after loading, starts the analysis of the structure. Then according to the results of the analysis and the forces and the moments, the structural design is performed. In all stages, it is tried to reduce the complexity of the connections, lateral load resisting system, structure type (frames) and difficulty of implementation to the least considering the quality of performance and existing facilities in regions with similar climates. In case of publication of new editions of national codes, regulations and standards, the projects should be re-edited based on the latest edition of the mentioned documentation. Because of high earthquake risk in Iran, it is necessary to apply certain technical designs and principles to reduce the risk in structures during likely earthquakes. Specifically when the building is used as school for the benefit of the generation that builds the future of the country, the issue becomes more important.
After the architectural and structural design, for the purpose of providing educational spaces throughout the country with safe and favorable facilities for students and staff and enhancing the quality of education, mechanical and electrical equipment are designed using high-quality, standard and safe materials. This, in turn, will be followed by the proper implementation and compliance with standards and regulations of educational buildings.

With regard to achieve safe, simple, solid, long-lasting and noble schools that also have a proper identity and which can be efficient and beautiful for many years, in addition to attention to the principles of correct design and operation of the aforementioned criteria, preparing and updating codes, standards, guidelines, directives, regulations, provincial and regional visits and seminars and holding training sessions and seminars and participation in scientific seminars and workshops to promote this important issue is always on the agenda.

2.1 Preparing, compiling and updating the criteria, standards, guidelines, circulars and regulations relating to the design of educational spaces and space utility and locating educational and sports spaces:

Based on the fact that setting regulations and technical standards and equipping educational spaces are based on national and international standards, DRES regularly and systematically collaborates with different institutions and has performed several studies on implementing space and equipment standardization.

If important issues are added in the latest editions of the authentic international regulations and codes, DRES will put them on agenda until national standards are updated and published.

If a criterion or a paragraph of the regulations is ambiguous or has not provided any explanation for a case, relevant competent centers are requested to offer the solution on the agenda.

Schools Hygiene Regulations

To accomplish the agreement between Education Ministry and Health, Treatment and Meical Training Ministry on performing school hygiene regulations by DRES and Sports and Health Department and Hygiene Department of the mentioned ministries to improve the level of performance and develop health-based training, DRES must supply schools with proper spaces and environment and medical faculties must supervise the activities according to the regulations.
In order to compile circulars and required technical guidelines, in addition to those pointed above, the following can be mentioned: preparing building monitoring checklists specifically compiled for schools including the architecture, steel and concrete structures and installations: electrical and mechanical, instructions on details of bracing connections, preparing a design workbook, instruction on quick evaluation of the strength of the structure of buildings for private schools, seismic behavior and design of base plates in braced frames, computing end plate moment connections, criteria and guidelines for designing partitions (non-structural walls), the plan for preparing schools against earthquake, instruction on seismic evaluation and retrofitting of buildings with infill frames, etc.

2.2 Research

After reviewing the feasibility of and the need to promote updated scientific and technical information and conducting research projects on building safe schools from 2007 until 2010, DRES spent a credit of $400,000 for this purpose, whereas from 2011 to 2014 more research projects were required, so the Islamic Republic of Iran allocated ten billion, four hundred and eighteen million Tomans (nearly $4,500,000), which helped DRES in the renovation of schools. The implementation of these projects took place in collaboration with elite universities such as Sharif University of Tehran, Shahid Beheshti University, International Institute of Earthquake Engineering and Seismology and the Research Institute for Housing and Urban Development.

Below are examples of some of the mentioned researches:

- Modeling high schools, and Kar-Danesh schools in the hot and humid, and cold climates
- Choosing a suitable color for educational spaces
- Effects of increasing the height of school buildings (number of storeys) on cities and appropriate approaches for it
- Investigating the noise pollution in schools and the remedies
- Investigating the requirements and functions of children’s space in cultural and educational complexes.
- Prefabricated cellular lightweight concrete blocks and their applications in school buildings.
- Climatic zoning of educational buildings.
- Developing the criteria and regulations of outdoor landscape design for primary schools
- Providing cultural appendix for the design, construction and renovation of schools.
- Preparing maintenance instructions for schools.
- Lessons from the performance of school buildings during earthquakes in the past.
- Strategies to optimize fuel consumption in schools.
- Guidelines on climatic design of educational buildings - very cold climate.
- Guidelines on correcting locating the educational spaces.
- Power consumption optimization methods in schools.
- Industrial methods of construction in educational spaces and using pre-built industry.
- Regulations and criteria and general physical programs for technical and professional schools in Iran.
- Designing educational spaces using Flexible Forms.
- Educational spaces from psychological point of view.
2.3 Provincial and regional visits and seminars

Regarding development and quality improvement of the designs, DRES is responsible for the strategy, policy-making, management, support and evaluation of the head offices of the provinces and consequently the recognition of talented experts to determine certain auxiliary provinces for supporting others. In this regard, two methods are considered:

1. The first method includes individual visits from the engineering offices to effectively control the design process of structures and exchange information to resolve probable ambiguities through discussion.
2. The second method involves holding seminars or group meetings with a number of experts from some provinces to evaluate the projects jointly, removing ambiguities by experts and benefitting from university teachers on specific given subjects, the results of which are finally compiled as inquiries and codes of conduct.

It should be noted that, in addition to the pursuit of such aims as effective control of structure design in the provinces, clarifying ambiguities, consulting and deciding on the raised issues in provincial inspections and visits as well as case visits, other cases can also be remarked:

- Visiting the earthquake hit areas to report on the performance of school buildings and offering remedies to fix the likely problems (Bandar Abbas in Hormozgan, Kazeroon in Fars, Ahar-Varzeghan, Kaki in Bushehr and Beshagerd in Sistan, etc.)
- Investigating the products of companies introduced by the provinces, including checking the sample containers, wall blocks and panels, etc.

2.4 Holding training sessions, seminars and participation in seminars and scientific workshops

Training and re-training technical and professional subjects play important roles in advancing technical goals. On this basis, training courses, seminars and participating in professional seminars for experts with the aim of studying the issues, technology and new methods of design, re-training and the promotion of scientific knowledge has been on the agenda. The e-learning in cyberspace has also been considered.

DRES, by inviting all traditional architects and academics (in the form of a conference entitled "Iranian School Iranian Architecture") has tried to achieve the identity of Islamic Iranian architecture in the context of precise scientific research and taking into account the cultural and social conditions in the contemporary society so as to employ efficient procedures at reasonable timeframe to achieve an architectural view that in addition to the form (body), content characteristics of the buildings are recognized as well.

2.5 Development, equipping and preparation of existing educational and training spaces

Choosing furniture and proper educational equipment must take place according to the ergonomics of the education level. Given the importance of furniture in the use of educational space and its degree of flexibility, the type of furniture and its main characteristics must be examined in order to meet various educational activities. In fact, the training equipment and facilities must be able to respond to the various methods of teaching. Space variation through furniture by the students and based on their tastes can raise a sense of imagination and visualization in them and turn the classroom space into various spheres of individual and group activity.
DRES as one of the subset organizations of the Ministry of Education that is the highest and the only governmental reference for Development, Renovation and Equipping of Iranian Schools was established in 1975. This state organization consists of a central office and 31 representatives in all provinces of Iran. The main role of central office is macro policy planning, supervising and managing its agencies throughout the country. The mission of this organization is to construct, develop, renovate, reconstruct and retrofit the school buildings and also to provide them with facilities and equipment all-over the country. Understanding how children can protect their lives and reducing the vulnerability of disaster require thorough and careful study in high risk schools and focus on efforts to maximize the prevention or at least mitigation of disaster losses. Since 2003 government and parliament of Iran decided to improve safety level of schools, and at the same time DRES determined to generate standards and regulations to achieve safe school in disaster prevention and preparedness to resilience and recovery of schools after earthquake occurrence. As a result, allocating the governmental budget became vital in success of the first pillar. Financial resources to improve life safety of students from 2006 up to now are as follows:

- The Government of I.R. Iran has allocated more than $4.5 billion between 2006 - 2014 for the renovation and retrofitting of schools that led to the resilient school infrastructure and an increase of safety level of students from 37% in 2006 to 67% in 2014 as shown in figures A and B.

Such experience in mobilizing relevant budget for local implementation of safe school can serve as a role model for other countries. Besides cooperating with technical experts, consultants, architects, engineering societies, university professors, research institutes, and elite local universities, a general action plan has been scheduled and performed by DRES in order to achieve the mentioned target in development schedule as follows:

### 2003 - 2004:

- Affirming commitment to take action of disaster risk reduction in schools in IR. Iran
- Recording the data of unsafe schools and generating relevant guidelines and regulations
- Preparing a national plan for the disaster risk reduction in educational centers
- Estimating required budget to increase safety level of schools
- Coordinating and cooperating with consulting engineers
- Establishing a center of national management and peer review system to retrofit school buildings in IR. Iran

### 2004 - 2006:

- Increasing the number of consulting engineers
- Providing training courses for national and local authorities, engineers and experts related to the issue of disaster risk reduction
- Establishing a technical committee of school retrofitting in order to collaborate between the university and industry to clarify the ambiguous issues
- Managing and peer review of technical reports by the central office
- Establishing the portal of technical reports and instructions, news, published and shared documents relevant to safe school

### 2006 - 2015:

- Undertaking the research projects on safety of schools in cooperation with elite national universities and research institutes
- Presenting a vulnerability assessment method in three retrofitting procedures for every school and more than 55000 classrooms
- Implementation of retrofitting methods for more than 26500 classrooms
- Developing the technical guidelines
- Improving the risk assessment methods with high performance
- Projects management by local offices and final review by central office
- Developing scientific and research area in experimental and soft computing methods
- Development of Retrofitting Methods
Also there is a list of distinguished projects on retrofitting schools being conducted in cooperation with high-ranked university professors, engineer associations and research institutions named as follows. These researches benefit from the strong synergy between the science, engineering and management disciplines.

- Reviewers committee and technical supervising of the research contracts and technical reports on structural engineering
- Regulations for seismic evaluation and rehabilitation of masonry walls retrofitted by shotcrete
- Sensitivity of out-of-plane behavior of unreinforced masonry walls to in-plane damage
- On the influence of bay number, vertical load and connection rigidity of the frame on the behavior of infill frames
- In-situ static cyclic tests on unconfined and confined masonry school buildings
- Evaluation of seismic connections of special concentric bracing
- Guidelines for assessment and rehabilitation of school structures with infill.
- Evaluation of retrofit and demolish/reconstruction plans for vulnerable school buildings and proposing general actions plan
- Experimental evaluation of the nonstructural infill in moment resisting frames
- Evaluation of the retrofitting techniques on the brick and tile (masonry) school building with the emphasis on shotcrete

Enormous part of risk is related to physical structure of schools that have potentially serious impact on death toll and the amount of losses. There are actions that have been undertaken by DRES in Iranian schools to improve safety level in the first pillar as defined by WISS at the third UN World Conference on Disaster Risk Reduction in 2009
that will be explained in the following:

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1- Draft of Developing a Worldwide Initiative for Safe School. The UN General Assembly adopted the International Strategy for Disaster Reduction
for seismic risk from 2006 to 2014 illustrated in Table 1. The second row of this table contains the number of classrooms that have been studied for seismic risk in each year and this process has continued up to now. As a whole 64,053 classrooms were studied from 2006 to 2013. School building area in terms of square meter that has been studied for the same purpose is in the last row of the table with total amount of 6,711,000.

Table 1: Seismic Risk Study

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td>523</td>
<td>1346</td>
<td>9271</td>
<td>22750</td>
<td>10163</td>
<td>3297</td>
<td>4753</td>
<td>11908</td>
<td>212</td>
</tr>
<tr>
<td>Area (m²)</td>
<td>48,904</td>
<td>144,869</td>
<td>987,402</td>
<td>2,490,156</td>
<td>1,027,912</td>
<td>266,207</td>
<td>404,167</td>
<td>1,333,356</td>
<td>11124</td>
</tr>
</tbody>
</table>

Table 2 shows the number of classrooms and school building area that have been retrofitted and reconstructed from 2007 to 2014. The total number of retrofitted classes is about 28,000 and the total area is around 2,430,000 square meters. There is not any retrofitting action in 2006 but the most took place in 2012. The results of school reconstruction or renovation are classified in the right side of the table. It is clear that the number of classrooms and school area which have been constructed from 2006 to 2014 are illustrated in this table and there is a peak rate of reconstruction in 2008. Achieving the aim of safe school during the next years, decrease in the number of schools to be treated is clear due to allocated budget 1.

Table 2: Retrofitted and Reconstructed Schools

<table>
<thead>
<tr>
<th>Year</th>
<th>Retrofitted Schools</th>
<th>Reconstructed Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Classroom (m²)</td>
<td>Area (m²)</td>
</tr>
<tr>
<td>2006</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2007</td>
<td>121</td>
<td>15,753</td>
</tr>
<tr>
<td>2008</td>
<td>1293</td>
<td>144,493</td>
</tr>
<tr>
<td>2009</td>
<td>2237</td>
<td>219,167</td>
</tr>
<tr>
<td>2010</td>
<td>5376</td>
<td>533,419</td>
</tr>
<tr>
<td>2011</td>
<td>7085</td>
<td>545,456</td>
</tr>
<tr>
<td>2012</td>
<td>8519</td>
<td>675,598</td>
</tr>
<tr>
<td>2013</td>
<td>2207</td>
<td>184,280</td>
</tr>
<tr>
<td>2014</td>
<td>1101</td>
<td>92,544</td>
</tr>
</tbody>
</table>

DRES has made a major contribution towards structural development in implementation and retrofitting of school buildings and also promoting safety culture of students and school staff awareness that lead to disaster risk reduction in Iranian schools in the last 10 years.

As a result of these efforts, there are great consequences in upgrading safety level of schools. For example a 6.4 Richter scales earthquake occurred in the city of Ahar (East Azerbaijan) in Aug. 2012 that caused damages on many buildings. Survey was conducted to evaluate the post-earthquake condition of East Azerbaijan province. Based on the survey, no damage was observed on newly constructed schools. From the post-earthquake condition, it can be concluded that the retrofitting and construction approaches adopted for the schools of this province have successfully prevented the school buildings from major damages. As a comparison, there were some houses located near school buildings that were seriously affected by the earthquake shaking. Following picture shows the post-earthquake condition of reconstructed schools.
There were the same experiences in the provinces of Fars and Southern Khorasan in Iran. In these cases, there was slight damage to school buildings along with only a few non-structural cracks. As it was expected, retrofitted schools had great performance during the earthquake such that they were used as disaster management centers.

Fig. A shows life safety of students in 2006 that is only 37 out of 100 and the Fig. B illustrates the very factor in 2014. By comparing Fig. A and Fig. B, a 30% increase in the safety level of student's life is crystal obvious from 2006 to 2014.

Insecure and hazardous devices in several educational spaces in Iran have been the cause of reduced level of education quality and making classroom spaces unsafe and dangerous. Firing at a number of schools and threatening the lives of students in years made it inevitable to avoid using unsafe equipment such as oil and gas heating devices, improve old equipment and use appropriate and standard equipment.

For the purpose of preventing such events and removing hazardous equipment, standardization of heating devices in Iran is considered in order to enhance the safety of students in educational spaces and consequently increasing the quality of education in a risk-free environment. Therefore, since 2013, a nationwide directive was issued and put on the agenda to collect all the non-standard and unsafe equipment and replace them with standard facilities.

Since 2013, regarding the budget funded in Iran for the standardization of school heating systems, a guideline was prepared for implementing the above-mentioned rule at the Engineering Department of DRES, and was notified to the head offices all over the country.

The provisions of this directive, by prioritizing educational spaces are as follows:
1. Removing all non-standard and not-allowed heating devices (for use in educational areas) from urban and rural schools and dormitories.
2. The standardization of heating devices in rural schools considering the climate and number of classrooms.
3. Standardization of heating devices in dorms considering the climate.
4. The Standardization of heating devices in urban schools considering the climate and the number of classrooms.

Implementing the standardization plan in Iran, the offices of DRES received instructions of the agenda to collect all unsafe and non-standard equipment and replace them with standard safe equipment. It is estimated that at the beginning of the project 45% of the whole classrooms (264,109 classrooms) were substandard.

The total number of classrooms before starting the standardization plan (from the technical ID System of schools) = 476,072
However by the implementation of this plan, according to the statistics provided by DRES just 28% of the total number of classrooms in Iran required to be standardized by 2018.

4.1 Saving Fuel

To provide solutions for saving fuel in educational spaces in order to maintain national capital and the environment purity is another important mission of DRES. For this purpose, the use of renewable solar energy to provide hot water and the use of geothermal energy to provide the heating could be mentioned.
Some constructed schools by DRES in Iran
In the culture of Islamic Republic of Iran, participating in public improvement, welfare systems and helping those who live on charity is always appreciated. Therefore, one of the important roles of DRES is to keep contact with and gather donor’s resources for the sake of Safe School.

Beneficent and wise people of Iran found out that one of the main priorities of the country for education and training is solving the problem of lack of educational spaces and schools. Although the Education Ministry was responsible for the task, due to the increasing number of students especially in the years after the Islamic revolution, they changed their charity approach toward building schools (especially in deprived areas) showing the high national culture and beliefs. Their activities included donating lands, providing educational equipment, giving scholarship and building schools.

Introducing State and Provincial school-builders charitable communities

This non-governmental community is considered as one of the main assistants of the Ministry of Education in association with DRES to absorb public aids and participation for construction of educational spaces all around the country. The members of this community are donors from different parts of the country. School-building donors’ community is one of the greatest NGOs in Iran and even in the world. Representatives of this community in provincial centers are considered as provincial school-building donors’ association. It has also some offices in cities which cooperate with the offices of DRES.

The goals of school-building donors are as follows:

1. Promoting the culture of participation.
2. Policy making and determining strategy for constructing educational spaces
3. Team working to achieve the goals of the community.
4. Making efforts to improve financial resources
5. Supervising the optimum performance of legal comments and purposes of donors during and after their life
6. Providing proper supportive, cultural and social situation and attracting donors who live abroad
7. Planning for elevation of the education culture.
8. Supervising on quality performance of education and training activities and the way donor-built schools are managed.
9. Supervision from society experts in close coordination with DRES for better performance of the donor’s projects.

DRES established the bureau of Public Contributions in 1990 in order to organize required educational spaces constructed by donors.

Some highlighted activities of this bureau are as follows:

- Attracting 25530 donors who participated in school-building in all provinces.
- Participating in building 17840 schools including 100427 classrooms after the Islamic Revolution.
- Finishing 529 schools including 2953 classrooms (338085 m$^2$) in the first half of the year 2015 by donors.

Number of donors living abroad = 832
Some important activities conducted by DRES to dignify school-building donors are as follows:

- Cooperation with the media to introduce donors and broadcast their activities to society (making several films about donors and showing them on TV)
- Publishing the book series “the Manifestations of Love and Devotion” in 8 volumes, and some special magazines about donors
- Holding exhibitions of donors’ activities
- Holding opening ceremonies for new schools
- Naming squares and streets in honor of donors
- Holding 17 festivals of donors in order to develop participation culture and to discuss the problems and to attract public aids.
- Holding several conferences for glorifying school-building donors and introducing the position of donors to the society.
- Holding such conferences in foreign countries (UAE and Turkey).
- Absorbing the average amount of $300,350,000 from donors between 2007 -2014 (73% of which was related to construction, 23% to donation of lands, and 4% to school equipment)
- Performing students’ participation plans in the renovation of schools
- Holding meetings with wealthy people in Tehran and other cities with the cooperation of Donors Community.
- Developing donors’ website for recording their information and projects
- Designing a portal for the bureau of Public participation and the festivals to document all principles, news, and actions
- Sending SMS’s on different occasions to the donors and participating in their meetings
- Solving donors’ problems and difficulties.

Number of national donors up to 2015
6. The Operating Systems of DRES

The base of correct planning and performance evaluation and the investigation of the activities of any organization is the statistical data and with the right combination of the data, the required information is obtained, which acts as the most important tool available to the management which in addition to providing the possibility to study the status quo, it offers a clear picture of the future of the organization to achieve desired goals. The role and position of those individuals in the organizations who involved in data collection has now changed and they should somehow control and manage the organizational processes that operate via automated systems. Thus, with the advent of information technology, organizational roles have changed and this should be of interest to organization planners.

Space planning for education requires various statistical data such as the number of students in different courses and grades of study and in the gender distribution in various fields, the number of existing buildings in terms of different capacities and some technical, architectural and geographic characteristics, the number of buildings under construction from different aspects including engineering, technical, physical capacity as well as property status and the ownership of the building of educational spaces. Access to this information requires the use of different information and operating systems and fortunately, different systems are applied in the Ministry of Education. Organization creates the proper field for systematic planning better than ever in terms of the above including training process control planning system (TPCPS) and management system of organizational unit in the Ministry of Education, and information on students and classrooms based on grade, course and gender, and project management system in DRES to access the statistics on the spaces under construction and the technical ID of the spaces regarding technical characteristics of the existing buildings in case of logical relationship between existing systems and eliminating problems.

6.1 Space Technical ID System

As mentioned, one of the important systems for space planning is the space technical ID systems, the analysis and design phases of which took place in early 2003 in DRES and by 2004, about 80% of project was implemented in all provinces. However some measures were used to redesign the system on the basis of past experience and utilizing the new technology. As a result, the information of all sport, administrative and educational spaces that belonged to the Ministry of Education was recollected in 2010. (more than 107000 spaces)

In order to prevent the cost of new census for the spaces in later years, the second phase of the project aiming to identify changes due to the completion of new projects and natural disasters was implemented in 2012.

A view of space technical ID system for educational spaces- attached pictures and documents
One of the main concerns since the past has always been the access to updated and reliable information on the status of implementation and credit of projects throughout Iran. Therefore, the need for a unified system that can manage the project information has always existed. Over the years, several efforts took place in DRES to implement project management system which the result of these efforts was ready to use in 2007.

The aim of the project design and systematic implementation for mechanization of administrative activities of construction projects on operational level for experts and middle managers in the provinces and at the headquarters level is the establishment of the database of the results of system implementation operations to facilitate decision-making and planning system for the staff and better governance of affairs.

- Credits Sub-system (plan and project agreement)
- Financial sub-system
- Contract sub-system (managing contractors and projects contracts)
- Public participation sub-system (managing the information of public and participating projects)
- Technical sub-system (categorizing contract operation)
- Supervision sub-system (controlling physical progress of the project and supervising and investigating process of project status)

The system applies to all provinces so that all the provincial departments of DRES since the exchange of construction agreements or agreements signed by the benefactors until the final delivery of the project, record their activities in this system. The way the offices work is set in a way that they are visible in the system. Goals that will follow have been specifically considered by the designers and those who ordered this system.

Creating the required conditions for managers’ access to the information resulting from the executive operations of the system at different organizational levels instantly is one of the goals.
6.3 Information Bank of School-Building Donors

The participation of school-building donors plays an effective role in construction, reconstruction, retrofitting, equipment and providing the cost of education and training in Iran. According to official statistics, school-builders have participated in the construction of about 98000 classrooms since 1978 (started before the Islamic Revolution). The need to organize such a large number of donors and their intense activity resulted in developing the organization for school-building donors in 1999. Since then, different festivals for school-builders have been held annually which not only dignify their activities but also introduce their significant roles in education and training in Iran. The office of Public Participation operating under the chancellor of management, support and public participation of DRES, made possible the interaction between state sections and this organization and also provided required foundations for better performance of this organization’s activities. In this regard, information bank of School-building donors started up for the purpose of managing the information of school-builders, projects, commitments, the donors and permanent connection with them. The number of these donors (considering those who assigned a little money and those with large contributions) are evaluated as several hundred thousand. But, since the establishment of this information bank in 2009, commitments and project information of more than 7500 donors have been documented. This system has been unified with the systems of space technical ID and project management.

6.4 Business Intelligence

Each of the systems mentioned, is established on in its own operational field in DRES so that a large number of personnel from all departments can make use of it. Also there is a logical relation between the information of the systems to ensure the validity and integration of the data that has resulted in knowledge production or at least preparation of management reports to be used for proper decision making. Therefore, in 2010, the Business Intelligence system was set up that by gathering information from the systems of:
- Space technical ID
- Project management
- School-building donors
- Training process control planning system (TPCPS)
could provide reports and Key Performance Indicators (KPI) for the senior managers of DRES.
Disaster Management

Disaster is considered as a condition that occurs suddenly or uncontrollably through accidents, occurrences, human and natural activities (except in security and social areas) and results in difficulty for a community and surmounting these difficulties needs quick essential emergency actions.

According to the studies around the world, Iran is among the top ten accident-prone countries in the developing countries. Therefore, international initiative of Hyogo Framework for Action which was created during the period of 2005 - 2015 aiming to create compatibility in nations in addressing natural disasters and decreasing their destructive effects is welcomed by the Islamic Republic of Iran. So, it is one of the first countries that implemented HFA nationwide, provincially and locally.

Comprehensive disaster management is a process in which some planning, activities and functions are made by governmental and non-governmental organizations to recognize and decrease risks (risk management), and managing the operation of response, resilience, recovery and rehabilitation of the affected area (disaster management). During this process it is tried to prevent disaster seamlessly, in a comprehensive manner and with the help of existing tools, observing precursors and analyzing information resources. Otherwise it is tried to fight the disaster to decrease life and financial losses to recover the conditions.

Disaster management includes 4 phases which are as the following:

A- Prevention: a set of actions which with the purpose of preventing occurrences or decreasing their destructive effects, evaluate the risk level of society and decrease it to an acceptable level.

B- Preparation: a set of actions which increase the ability of the society in performing different stages of disaster management. It consists of gathering information, planning, organizing, and offering management, education, resources, facilities, structures, practice and maneuver.

C- Dealing with the incidence: Taking actions and providing necessary services after the occurrence of accident with the purpose of rescuing human life and property; providing a relative welfare and preventing from loss development. This operation consists of informing, warning, searching, rescuing, hygiene, treatment, providing security, transporting, communication, medical emergency, interment, waste disposing, fire containment, controlling dangerous situations, fueling, establishing lifelines, and other necessary actions.

D- Reconstruction and rehabilitation: reconstruction includes all necessary actions after occurring disaster which tries to restore normal situation in affected areas. In reconstruction process, all features of sustainable development, safety norms, public participations and cultural, historical, and social problems of affected areas should be considered. Also, rehabilitation is considered as a set of actions which restore body, mental, psychological, and social conditions of affected people to a normal situation.

Iran, due to its geographical condition, is one of those countries which are continuously affected by natural disasters like serious and repetitive earthquakes, flood, droughts, landslides, desertification, deforestation, storm, etc.

Disaster Management in IR Iran

Islamic Republic of Iran, in order to fulfill Hyogo framework, has started up a large number of actions relevant to decreasing natural disasters and their effects nationwide, in provinces and locally. The main focuses of these activities include codification and approval of laws and documents in relation to the decrease of these disasters. Some of these laws are as follows: law of establishing National Disaster Management Organization (NDMO), and also developing 50 related executive by-laws which are approved by the cabinet. National structures of this law applied on the local and provincial level and resulted in an organization which paves the way of operations related to natural disaster decreasing in a more comprehensive and harmonious manner. In the chart of the organization, the supreme council is appointed by the Presidency and headed by Deputy of Interior Minister. The following activities are some of the functions of NDMO: unified management in policy-making, planning, creating unity in different executive and research issues, centralized informing and supervising over different phases of disaster management, organizing and reconstructing the affected areas, utilizing all facilities of public and state associations and companies, banks, state insurances, military and disciplinary forces, non-governmental public associations, Islamic councils, municipalities, non-
Some missions of the organization are as following:

1- Providing executive policies and strategies in relation to the four stages of disaster management and planning for making use of all necessary facilities and abilities include governmental, non-governmental and armed forces during operational period and also providing it to be approved by the Cabinet.

2- Creating harmony and unity among all different forces in relation to the four stages of disaster management.

3- Analyzing, codifying and proposing comprehensive cultural, research, educational, advertising, informing and training policies and plans in Supreme Council about four stages of disaster management.

4- Empowering international and regional cooperation, negotiating and using technical knowledge and experiences of other countries, foreign institutes and associations in relation to the four stages of disaster management, and also country representation in international communities.

5- Documenting and analyzing incidents and acts.

6- Planning and coordinating for organizing and training all public communities (NGOs), non-governmental institutes, volunteer forces in four stages of disaster management.

7- Executing approvals and propositions of Supreme Council.

8- Supervision over executing and developing effective prevention and retrofitting systems and seismic rehabilitation of buildings, foundations, and lifelines, reconstruction of worn textures, Reinsurance and compensation methods for kinds of insurance, financial supports and incentive mechanisms, special facilities and supportive funds with direct cooperation of the related forces.

9- Contributing to the development of active scientific and consultative institutes and using their cooperation for standardization, quality improvement, controlling services, goods, buildings and infrastructure safety, and supervision over observing approved standards.

10- Codifying rules for financial division in order to improve safety culture for all individuals in society with direct cooperation of related Ministries, organizations, institutes and associations to the disaster management and submitting it to the Cabinet for approval.

11- Codifying rules related to the levels and state emergency determination and the methods for informing disasters resulted from unexpected events.

12- Notifying principles to the related organizations about the manners of taking necessary actions at the time of occurring unexpected disasters.

13- Taking necessary actions for handing over all needed facilities and abilities of State disasters management including governmental, non-governmental and armed forces during occurring the disaster.

14- Codifying rules related to the investigation of violation and outrages of official authorities in all governmental and non-governmental institutes, military and disciplinary forces, and all associations under direct command of the Leadership in executing orders and approvals of Supreme council during the occurrence of the disaster.

15- Codifying rules about preventive affairs and dealing with misusers, agitators, and looters during the occurrence of disaster with direct cooperation of Judiciary and Armed Force general Staff and submitting them to the Cabinet for approval and supervising on their execution.

16- Codifying principles and by-laws related to the attraction, distribution, and use of public, foreign and international help with direct cooperation of related organizations and submitting them to the Cabinet for approval.

17- Establishing a comprehensive management system of information by using relevant research-scientific information centers and responsible executive organizations; creating an information center of disaster management organization in order to make an early warning of disaster and informing people and authorities during disaster.

18- Supervising over and evaluating acts of executive forces in relation to four stages of disaster management (especially preparation and dealing with), and handing report to the supreme council.
The following plans and actions are essential for coordinating the measures of different organizations and institutes in managing disaster:

a- A proper organizational unit shall be established in Ministries and related organizations for managing disaster. It should also pass the approval of the Cabinet.

b- Disaster Management Coordinating Council shall be established, chaired by the chairman of the organization and with plenipotentiary representatives at the level of deputy chief and a member of relevant agencies and institutions to coordinate activities related to the four stages of disaster management.

c- Disaster Management Coordinating Council shall be established, at the provincial and city level chaired respectively by the governor-general and governor. All organizations are the members of this council.

d- Regarding the importance of Tehran as the capital of the Islamic republic of Iran, Disaster Management Coordinating Council shall be held in Tehran, chaired by the Mayor.

The agenda of National Disaster Management Organization is very wide including research on safety measures, analyzing and publishing information related to the disaster occurrences, making coordination between rescue activities, reconstruction and recovery also supervising over activities like budget determination and providing supplies for provinces.

Law of establishing national disaster management organization was approved by social commission of Islamic Consultative Assembly (parliament) based on the Article 85 of Constitutional Law dated on May 20, 2007. After the approval of this law, the organization began its activities and enjoys special budget raw for decreasing the risk of disasters and their management.

The main Principles of Disaster Management:

According to the definition provided by United Nations Development Program (UNDP), disaster management is considered as making management decisions and taking executive acts for preparation, decreasing destructive effects, responding, reconstruction and repairing effects resulted from natural or man-made disasters.

In another definition, disaster management is known as a range of designed acts for continuous control of disaster and emergency conditions and also providing a framework for helping people in peril or reconstructing the damages resulted from disasters.

According to a traditional pattern, disaster management consists of three phases: 1- before the occurrence, 2- during occurrence, and 3- after the occurrence which are considered as disaster management cycle and it is shown in the following image.

- **Pre-disaster Management (before the occurrence of disaster)**

  People’s reaction to disaster is completely different from their reaction to its probability. Man is not used to caring about risky occurrences unless it changes into a terrible disaster. That is to say, the level of public knowledge about this issue is so low and people need to be trained by holding public
training to decrease the risks resulted from disasters.

**During-disaster Management (during the occurrence of disaster)**

Activities in this phase are performed with the following purposes: decreasing the amount of losses, rescuing lives, decreasing destructive effects of disaster, and dealing with other consequences of disaster. Some of these activities consist of pre-planned programs, activating anti-disaster systems, rescuing and searching operations, taking necessary measures for food, shelter, medical care, evaluating disaster, taking related measures for evacuating buildings.

**Post-disaster management (after the occurrence of disaster)**

Organizing and reconstructing are the two parts of this phase since with organizing conditions, it returns to the normal situation. On the other hand, disaster management is defined as repairing all services and destructed foundations, physical replacement of destroyed buildings, reviving and enabling economic channels, and finally improving living conditions of the injured society.

**Disaster Management in Education System**

Students are considered as one of significant and effective social strata in changing attitudes of families and society based on sustainable development which grows in schools and according to the system of the Ministry of Education. School, as a place in which students spend a considerable amount of time, should provide safe conditions for students, so that parents feel secure about their children and students can educate without any stress. This group is so important that decuple-principles of cities retrofitting against disasters considered them and stressed upon decreasing the risk of disasters in school providing safety and training courses for the students. In the Hyogo framework, training children about decreasing the risks of disasters is one of the main issues especially in the education decade (2005-2015). For this end, the Ministry of Education with the cooperation of disaster management organization and the Red Crescent organization established School Disaster Management Committee to decrease the risks for students.

The process of Establishing School Disaster Management Committee

This committee was established with the aim of mobilizing school forces and facilities to participate in preventive measures. These measures include: education and preparation of students and teachers, recognizing structural and non-structural risks and their safety-making, notifying preventive methods for disasters, encouraging experts and capable people to provide first aids, fire extinguishing, searching and rescuing, providing security and consultation. The result of these measures is the safety of schools against earthquake and other disasters.

The following picture shows the process of achieving this purpose:

**Step 1: Providing executive arrangements**

For establishing School Disaster Management Committee, a set of initial actions should be taken, like provincial and local cooperation, recognizing interested people and all executive players in the program. This kind of cooperation ensures proper performance of other steps which is done in two levels inside and outside school. By provincial cooperation, it means cooperation with administrative organization of disaster management. The most important of these organizations are "Office of the Provincial Disaster Management", "Department of Education and Training in Provinces", "Province Red Crescent", "Fire Department", "NGOs active in Disaster management", and other active organization in the Province. If done in a provincial workgroup and under the supervision of provincial institutes, it would always be possible to provide protective and preventive measures.

**Step 2: Sensitization of Executive Players and Principals**

All executive players and principals of School Preparation Plan are required to become familiar with initial principles and concepts of School Disaster Management Committee. For this end, an educational workshop was held for their sensitization. Some of main issues of these steps are as following: knowing potential risks, prioritization of risks, probable methods for removing risks and regulating timing application.
Step 3: Selecting the Members of School Disaster Management Committee

After getting information about this committee during the previous step, principals properly notify their students, teachers and parents to provide their volunteer participation in the committee. Members of this committee in the schools, regarding the number of students, are: 1- School principals, 2- representative(s) of teachers Councils, 3- Executive actors of schools and 4- representative(s) of Students communities.

Step 4: Training School Disaster Management Committee Members

All executive players in cities, (government disaster management, Office of Education and Training, Municipality, Red Crescent, Fire Department, etc.) and the members of the committee (Principal along with one of deputys and teachers) are required to become familiar with the principles of this committee by a workshop. This workshop provides all necessary information about probable risks of disasters, preventives methods, and duties of each organization, and familiarization with the process of executing plan.

Step 5: Codifying Plan for School Disaster Management

At this step, the principal should evaluate school capacities and facilities with the cooperation of other members of the committee to provide a comprehensive plan for school disaster management. The key elements of this plan are as following:

- Evaluating and determining each school capacities and facilities regarding human, financial, equipment and facility resources for executing the acts of School Disaster Management Committee.
- Providing lists and prioritizing probable risks resulted from unpredicted accidents according to the local features.
- Organizing four operation groups based on executive organization chart.
- Codifying probable strategies and executive programs for decreasing risks resulted from disasters.

Step 6: Establishing and Training Operation Groups in Schools

According to the organization chart, managers of School Disaster Management Committee should be selected from talented and interested educators and students and they are required to participate in the committee meetings. These managers are asked to recruit and register the members and take them to the committee. Then, the essential plans of Red Crescent and Fire department are provided for them. Each operation group is trained under the related specialist (Red Crescent, Fire Department, and Education and Training Department).

The training is performed with the purpose of increasing knowledge and technique about disaster management, which results in a better performance of students, teachers, and parents in implementing the plans and finally decreasing probable disastrous risks. Accordingly, educational program is designed for three different groups of students, teachers and parents based on three phases of disaster management cycle.
**Before the Occurrence of the Disaster**

| Student       | 1. Increasing the level of knowledge about earthquake in school and at home. 2. Familiarization with relief supplies. 3. Constant and necessary warnings.  
| Teacher       | 1. Identifying probable risks in school. 2. Identifying geographical location of relief places. 3. Participating in disaster management committee. 4. Participating in learning related issues and informing students. 5. Controlling non-structural components. 6. Familiarization with Relief supplies.  
| Parents       | 1. Increasing the level of knowledge about destructive effects of earthquake in a building. 2. Controlling non-structural components. 3. Familiarization with and providing relief supplies.  

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**During the Occurrence of the Disaster**

| Student       | 1. Keeping calm. 2 correct refuge taking.  
| Teacher       | 1. Keeping calm. 2 correct refuge taking.  
| Parents       | 1. Keeping calm. 2 correct refuge taking.  

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**After the Occurrence of the Disaster**

| Student       | 1. Keeping calm and avoiding stress. 2. Cooperation with rescuers and assistance to victims. 3. Getting information. 4. Analyzing the building of school and home.  

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**Step 7: Delivery, Equipment and Up-dating Relief Tools**

Necessary tools of School Disaster Management Committee should be provided through the check list of school safety and rescue equipment and with cooperation of related officials.

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**Step 8: Identifying Non-Structural Risks and School Safety-Making**

School Disaster management Committee, with the cooperation of related operation groups constantly identifies «non-structural risks» and removes problems. By «Non-Structural Risks, we mean all internal components and appurtenances of building which are not used to resist gravity or lateral load during construction. The following picture shows some non-structural components:
Generally, everything performed for decreasing risks of non-structural components is called controlling non-structural components. Some of these activities are as follows: limiting displacing, preventing from eversion, and decreasing the effects after destruction and proper location or replacement. Applying one or more of mentioned activities depends completely on its location, expected usage, and other factors affected directly by that component. The following picture introduces one sample of controlling non-structural components.

These components can be categorized into the following:

- Architectural components (Doors, windows, building facades, parapet, dome roof, ceiling, decorative utensils, partitions and …)
- Administrative tools and special non-administrative tools (tables, chairs, boards, computers, shelves, book cases, dressers, etc.
- School laboratory and workshop tools
- Mechanical, electrical and communicative tools in schools (Ventilation systems, gas and water piping, lights, chillers, elevators, water and fuel reservoirs, and …).

Restraining non-structural elements

**Step 9: Public Informing in Schools**

School Disaster Management Committee seeks to increase the awareness of teachers and students about occurrences, preventive methods and necessary acts for maneuvers according to an executed plan action, through different scientific and cultural programs (holding competitions, trips, and newspaper stands) and with celebrating different occasions (Firefighter’s day, day of natural disasters effects, earthquake maneuver day, national day of earthquake and safety, etc.).

**Step 10: Practice and Preparation:**

All members of the committee and the officials of operational groups should practice their plans constantly like evacuation drills as extracurricular activities, so that they are always prepared to deal with the occurrences and to control them.
Step 11: Holding Maneuvers in schools:

A maneuver is held annually in Iran providing necessary training for the operational groups and establishing essential tools for them. For this end, State Disaster Management Organization along with Red Crescent and the Ministry of Education designed the maneuver of “Each Family, one Rescuer”. This maneuver is held annually on December 26 for training the skills of rescue, first aids, and for applying these skills during disasters. This maneuver is held simultaneously in all cities and with the aid of skillful trainers. Average number of these maneuvers in the country, from 2005 to 2015, was about 421145 which was reported by the Relief department of Red Crescent.

Step 12: Documentation and Updating Measures and Creating Information Bank

To help the activities of School Disaster management Committee to continue, they should be filed in minutes by the committee chairman and a step by step report shall be delivered to the representative of the department of Education and a report shall be filed in the school. At the end of each education year, every school has a comprehensive report from its activities and experiences about disaster management.
Education and training as an effective institution has always been considered in the society. From methodological point of view, development of education and Training originates in the history and its beginning can be considered as the beginning of great civilizations. During the past age, education and training experienced significant growth like other sciences and much research and numerous documents were made about it. In this approach, upbringing future generation is one of the main purposes of education system in Iran. The quality indicator of this system can be the success of this system in fulfilling this purpose.

To be purposeful is one of the main elements of education. In fact, every human activity has a certain purpose and education is one of the most significant activities of human beings. Scientists, therefore, codified detailed principles for definition, categorization and usage of purposes in the issues of education and training. Purposes are determining factors of all details of education programs.

Attention to and categorizing educational purposes began in 1950 and gradually better categories were provided. Some of the famous and most important categories are those introduced by Benjamin Bloom, Robert Mills Gagne, M.D. Merrill, etc.

**Final purposes of different education courses:**

- **Pre-elementary school:**
  Preparing children to be familiarized with school conditions, decreasing accent problems and improving sociability of children.

- **First and second course of elementary school:**
  Preparing and educating children to learn skills of listening, writing, speaking, thinking, and developing mental abilities like self-awareness, correct understanding of concepts and reasoning, stylizing emotions, laying the foundations of religious, ideological and moral rules appropriate to the age, understanding social role and position of individuals and achieving the spirit of cooperation through practice and experience.

- **First course of high school:**
  Guiding students from childhood to adolescence, training self-confidence and self-awareness, familiarizing with religious, belief, moral and social issues and preparing for selecting different life paths according to talents, abilities, and interests.

- **Second course of high school:**
  Improving self-confidence and self-awareness, achieving religious issues, moral virtues and values, developing mental abilities, reasoning, and preparing students to enter into social life, occupation or continuing education according to their interest, talent and facilities and finally necessary preparation for higher education.

- **Technical and Vocational High school:**
  Improving the level of public culture and knowledge, better understanding of students’ talent and interests, providing a good condition for guiding them into a beneficial occupation or achieving necessary preparation for higher education.

**Work and Knowledge Schools (Education Skills):**

Training human resources at the semi-skilled, skilled, skillful and necessary supervisor for industry, agriculture and services sections according to economic, social and cultural needs of the country so that everyone in every occupation has the necessary skills for that occupation.

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**1. Educational books of Elementary Schools (Age group 7 - 12 years old)**

The first and main criterion for selecting education material is the purposes of education and training. As one of these purposes, it can be referred to glorifying public talents. Education plans should be in coordination with different periods of children growth. In this period, children have special physical, mental, emotional, and thought features. Their education material should be selected based on their physical, mental, emotional and social growth. They should be appropriate with the duration of their education and flexible enough for teacher to be able to act properly in selecting method and observing individual features of students.
Team work practice

Protection of environment

Regulations at home and school

Introducing rescue and emergency services

Risk causes in the city
2. Education in the first and second courses of high school:

At this age, education is provided in areas like social system, culture, identity, space, location, continuity and change. These different areas are located under topics of our rights and responsibilities, law, knowing environment, protection from habitats, deserts, forests and water of Iran, air pollution, tourism, environmental protection, passive defense, earthquake, preparation against it, safety, security and threats, exploring in distant past, earth at the service of human, and finally familiarization with first aids. All of these topics are just for better and on time relief to the victims.
disaster preparedness

protection of environment

Natural Hazards

Over the ground
- Typhoon
- Thunderbolt
- Flood

Within the earth
- Tsunami
- Volcanic eruption
- Earthquake

Within the earth

Over the ground

Typhoon Thunderbolt Flood Tsunami Volcanic eruption Earthquake

Within the earth

Over the ground

Typhoon Thunderbolt Flood Tsunami Volcanic eruption Earthquake

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Over the ground

Typhoon Thunderbolt Flood Tsunami Volcanic eruption Earthquake

Within the earth
Various examples of high school textbooks and teacher’s guides
Common Types of Faults

Motion of four dominant waves of earthquake

Assessment of school children’s knowledge on earthquake in June 2014

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Correct understanding</th>
<th>Conceptual understanding</th>
<th>Wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9</td>
<td>%42</td>
<td>%58</td>
<td>%72</td>
</tr>
<tr>
<td>10 - 12</td>
<td>%61.5</td>
<td>%48</td>
<td>%39</td>
</tr>
<tr>
<td>13 -14</td>
<td>%39</td>
<td>%22</td>
<td>%23</td>
</tr>
<tr>
<td>15</td>
<td>%22</td>
<td>%10</td>
<td>%3</td>
</tr>
</tbody>
</table>

Assessment of school children’s action during earthquake in June 2014

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Recommended sheltering approach</th>
<th>Wrong approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9</td>
<td>%97</td>
<td>%3</td>
</tr>
<tr>
<td>10 - 12</td>
<td>%97</td>
<td>%3</td>
</tr>
<tr>
<td>13 -14</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>%100</td>
<td>0</td>
</tr>
</tbody>
</table>

Correct understanding: 42% 58% 61.5% 48% 39% 22% 23% 10% 3% 6% 15.5%
Conceptual understanding: 97% 97 100 100 3% 3% 0 0
Wrong: 97 97 100 100 3 3 0 0

During an earthquake when you are at school?
During an earthquake when you are at home?
3. Teacher Training and Improving Personnel

Education is the basis of development and today, human resources worth more than natural and underground wealth. That is to say, real wealth of every country is its wise and mighty men. Sustainable source of each society is human resource of that society which could be achieved by intellectual, emotional and social training (Farvandet, 1973). On the other hand, improving the quality of education depends completely on providing and codifying proper education in order to supply student’s needs and to improve education quality of teachers (Bandi and wiles, 2004). Teachers play important roles in schools. Since a great amount of activities in Ministry of Education are devoted to the provision and education of required human resources of society for its own use, attention to human resources can be a helpful tool in fulfilling its purposes. Regarding the number of staff, the Ministry of Education is the greatest state organization in Iran. The ministry, as a learner and educator structure, should pay more attention to human sources. Furthermore, more than 15% of state budget is allocated to the Ministry of Education. Advances made in experimental, mathematics, technical and human sciences, especially in educational sciences, psychology and technology, caused that teachers of all grades and courses pay continuous attention to the knowledge and necessary skills in transferring cultural features to the next generation, and also made them familiarize students with the use of proper methods, techniques, and tools. This is done through two stages of pre-service education (Education in Teacher Training Centers) and during it. Education during services consists of face-to-face, indirect, distant, self-training, radio and TV education. Education and promotion of teachers in the Islamic Republic of Iran is done through the following methods:

Before attending class for teaching, every teacher should be informed about the purposes of course which he is teaching so that they can plan an educational pattern, and determine the purpose of each lesson regarding cognitive, emotional, and psychomotor areas. It should be noticed that students of different courses have different physical, mental, emotional and social features and teachers should not expect too much of them. All teacher plans can be categorized into three separate categories of pre-teaching, post-teaching and during teaching skills. In this plan it is also referred to as the manner of providing lessons.

It should also be mentioned that there are different classes and students. Depending on the teacher’s interest and taste, classes are managed differently. So, some guidance about teacher’s and student’s behavior in class, disruptive factors in establishing relation between student and teacher, and how should a teacher deal with undesirable behaviors, have been referred in this plan. A successful teacher, with full knowledge of final purpose of each course, can determine his own education purpose which shows exact intention of teacher in teaching education materials. Assigning education, selection of materials and education materials are achieved through three methods:

- **Free selection:** teacher is completely free to determine education materials based on special needs of students.
- **Conditional selection:** among determined materials and books, teacher selects their own interested materials.
- **Limited selection:** Textbook compilation department writes textbooks and the teacher has to offer the contents of these textbooks to the students.

Before 1953 and the establishment of new education system in Iran, free selection was usual and teachers selected education materials. After that, up to 1966, conditional selection was introduced, but since 1966, it was replaced by limited selection. Generally, during primary schools, using textbooks should be limited and the main concentration should be upon student’s activities. In other words, students should actively participate in the class.
<table>
<thead>
<tr>
<th>Title</th>
<th>Education type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Face-to-face</td>
<td>Full justification of plan and its process of performance</td>
</tr>
<tr>
<td>2 Face-to-face</td>
<td>Disaster management bases and passive defense</td>
</tr>
<tr>
<td>3 Face-to-face</td>
<td>Mechanism of earthquake and other natural incidents and dealing with them</td>
</tr>
<tr>
<td>4 Face-to-face</td>
<td>Resilient School Workshop</td>
</tr>
<tr>
<td>5 Face-to-face</td>
<td>Disaster management bases and passive defense</td>
</tr>
<tr>
<td>6 virtual</td>
<td>School safety principles</td>
</tr>
<tr>
<td>7 virtual</td>
<td>Psychological support</td>
</tr>
<tr>
<td>8 virtual</td>
<td>Successful experiences in educating disaster management</td>
</tr>
<tr>
<td>9 virtual</td>
<td>Fire fighting</td>
</tr>
<tr>
<td>10 Face-to-face</td>
<td>First aids</td>
</tr>
<tr>
<td>11 Face-to-face</td>
<td>Finding shelter and emergency evacuation practice</td>
</tr>
<tr>
<td>12 Face-to-face</td>
<td>Disastrous situation.</td>
</tr>
</tbody>
</table>

4. Education in Non-Academic Books

Textbook production and utilization in different countries is performed through centralized and decentralized methods. In Iran it is through centralized method; that is to say the same material is taught all around the country. But in some countries like Britain, Australia, New-Zealand, USA, and Sweden, decentralized method is used. It means that schools try to approach the purposes of informed national plan but it is not necessary to follow the same textbooks and teachers are free to select their own education materials. Non-academic education materials can be effective in learning and education. They lead students to do more activities and research and to improve their thought and reasoning power.

Non-academic books are those which are designed and provided for creating motivation in learning and studying, compensatory education, increasing the level of knowledge, training mental and physical skills, developing social relations, and promoting learners based on special goals and plans. They are not necessarily dependent on education plans of that special course (Further Education Publication Office of Ministry of Education, 2000).

Therefore, it is necessary for teachers, students, and parents to have a positive view toward studying non-academic books and know that:
1- Non-academic studying does not mean studying any books. We are not allowed to read every book.
2- Non-academic studying completes and enriches the contents of textbooks and removes probable deficiencies of textbooks. We try to make education environment not only for achieving knowledge but for creating knowledge. This is obtained when students get involved in education. They should not only find and memorize knowledge, but should also process it.

Of non-academic books provided for students, it can be referred to Journals of Growth (Roshd) in different primary, adolescent and youth education courses.
DRES wishes to gratefully acknowledge technical and official support from:

- Disaster Management Organization of The Interior Ministry.
- Sports and Health Department of Education Ministry.
- Elementary Education Department of Education Ministry.
- Organization for Research and Programming Textbooks of Education Ministry.
- International Institute of Earthquake Engineering and Seismology.
- Tehran Disaster Mitigation & Management Organization.
- Managers and Staff of provincial offices of DRES.
- Managers and staff of all departments of DRES.
- Engineering and Research Department of DRES.
- Rescue and Relief Organization of RCS.
- Save the Children.
- Global Alliance for Disaster Risk Reduction & Resilience in the Education Sector.
The tasks accomplished by IR.Iran form 2007 to 2014

Pillar 1

Pillar 2

Pillar 3

12 years

24 national maneuvers

Improvement of 12,000,000 students’ awareness

Training taking cover in case of disaster

Training urban hazards

Condition of Life Safety in Schools 2006

Condition of Life Safety in Schools 2014

Total Number of Classrooms = 492686

Classrooms constructed by donors from 2007 to 2015

Allocated Budget for Reconstruction and Retrofitting

Person-Hour Training of Teachers