A mathematical model to evaluate the establishment of school buildings projects

Ameer A. Alraie [1] and Hatem Khaleefah Breesam [2]

[1]Assistant Lecturer, Department of Civil Engineering, faculty of Engineering, Kufa University, Najaf, Iraq, PhD researcher in Baghdad University, Baghdad, Iraq, ameer.alraie@uokufa.edu.iq

[2] Assistant Professor of Construction Mangement Engineering, Department of Civil Engineering, College of Engineering, Baghdad University, Baghdad, Iraq, dr.hatem2999@yahoo.com.

Abstract— ***School buildings projects are characterized by a special nature because of plentiful, diversity, different designs and spread across the country. School buildings need to continuous expansion with the natural increase in the population and the actual need of the country to raise the level of education. The most important requirements are the advancement of the educational process infrastructure, which includes the provision of school buildings and facilities. School buildings projects are exposed to multiple risks, including the provision of adequate financial allocations and the induction of suitable designs appropriate to the social and financial fact, the creation of strategic and interim planning of the projects and find out the available options for implementation. In this search A mathematical model was implemented using the C # language code and evaluation of the school buildings in two ways first The evaluation of the school in particular from the structural aspects of design, functionality, contracting, cost, operation, maintenance, demolition, restoration and other areas. and second Evaluation of schools in the area in general and determining the number of students, Number of Classes.***

Index Terms— Mathematical model, School building, School Evaluation.

1 INTRODUCTION

The important to the success of education process is highlighted in providing a sufficient number of school buildings, and maintain and sustain processes. So, the problem here, there is a growing shortfall in the presentation of school buildings, causing the inability to absorb the growth in the number of registered. This was reflected in the form of an increase in the number of schools that work double or triple-shifts.[1]

It is worthy to mention that most countries spend hundreds of millions of dollars a year on establishing school buildings, renovation and equipping, though, officials and society in these countries are dissatisfied with the performance of the school their buildings level because design her ideas and style of implementation be unusual not achieve their ambitions do not keep pace with the evolution methods of education, so demanding some of them to change the design and implementation of school buildings and changing the education systems method.[2][3]

On other hand , many researchers stressed on the critical importance of upgrading the quality of school buildings direct impact on students and their upbringing education and develop their abilities which are reflected on the development of society, the researchers believe that the educational institutions concerned with the design, implementation and equip schools to keep pace with the needs of the times you get the schools more successful and attractive to students and thus graduated generations of highly efficient in serving the community, thus, the institutions that are not interested in any of that they limit the capabilities of their children and generations graduated with less efficient than others. Characterized school buildings from other buildings when construction in terms of planning, design, implementation, given the nature used in the education process and have special conditions for the design, implementation and standards. [4][5][6]

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2 RESEARCH METHODOLOGY

Research methodology is based on the conduct theoretical and practical studies to reach the desired goals of the research in theoretical study in local studies and international studies, research and scientific publications in this field, as well as to take advantage of international network services (the Internet), The practical study is the work of a mathematical model to evaluate the projects of school buildings finally, a set of conclusions and recommendations required t overcome the direct subject.

3 RESEARCH OBJECTIVES

The goal of this paper is to work a mathematical model

to evaluate the projects of school buildings and solve problems that accompany the establishment and determine the actual need of schools and planning to fill the shortfall and deficit.

4 Research problem

The problem of school buildings is an important problem to be considered one of the most important infrastructure in any country. Therefore, the development of a mathematical model for evaluation is essential for the purpose of evaluating and reducing its problems**.**

5 Definitions of school building

Harold Marken known, "school building is not a vessel in which the curriculum offers it all but it is part of the curriculum as well."[7]

Bin Saleh define school building as: "constitutes a vacuum system contains a set of educational activities define its parameters and its divisions in light of educational philosophies adopted by the state in order to prepare the student and his education and build it physically, psychologically and value judgment. It is also builds an ocean encompassing these activities and is not in a vacuum built but with the vital surroundings, which is determined by its features of environmental, social and technical conditions prevailing in the place. [8]

As others have defined as "the place where the students interact with peer students, and with the teachers and with other material things available in the school, where students gain knowledge and experience and shaped public behavior. [9]

School building is considered a component of the educational elements, that contains, which is inside all educational practices and consists of classrooms and laboratories, playgrounds, arenas and rooms supervisors and management, is one of the elements of the educational process because it is a place where teaching and learning take place. It is the place where the student's interaction with his friends and his teachers and with other material things available in the school and the student acquires knowledge and experience is shaped public behavior, and have many social trends and values. [10]

The overall profile of the school building is planned and designed and equipped place typical specifications by planners educators, engineers, specialists, different specifications depending on the level of education, and is the achievement of the objectives of Education and the requirements of the targeted student development and upbringing and the formation of his personality and its interaction with the perimeter of the community and the environment. [11]

6 Importance of school building

The importance of school building are summarized in the following matters:

1) School building is one of the cornerstones upon which the educational process four ingredients: curriculum, teacher and student and educational means. School building crucial in the implementation and success of the educational plans in all its dimensions, as it represents a component of the infrastructure on which the comprehensive development plans components, provided that it is designed in accordance with the educational standards and having the facilities and equipment necessary for the implementation of educational plans and success and tools.
2) School building helps in achieving education goals in the best way and the most successful methods and educational activities educational, by taking advantage of the school building facilities at social events where members of the surrounding community involved in school such as the library, playgrounds, theater, indoor halls, stadiums and other.[11]
3) School building helps designing according to the specifications of the model effectively in the upbringing of generations able to Renaissance society, where he believes the students an atmosphere of safety and psychological comfort and help in their development in an integrated manner of psychological and physical, behavioral and social point of view
4) School building promotes role of the teacher in the delivery of information to students in the easiest methods and the latest tools and modern scientific equipment, which satisfy the desires and needs of students. In addition to contain the school building medical clinics that help in the treatment of patients and the ambulance and the injured students without the transfer of students to the hospital in simple cases.[12]
5) Typical building design specifications contribute to attracting students and motivate them and to keep them interested for educational programs, and develop their sense of belonging to the school.
6) The school building, which takes into account the good in its design with special needs, helping to implement the merger with normal programs. [13]

7 Standards and requirement of a school building

7.1 General provision

1) General site plan appear the gross area of the land.
2) Horizontal display plan for the ground floor appear the areas and dimensions of the rooms (architectural plan).
3) Horizontal display plan for the first floor show the areas and dimensions of the rooms (architectural plan).
4) A Table signalize how labs are used.
5) The school building must be only used to render the purposes of the educational phase determined in the license application, and must not be used for any other purpose excepting education.
6) The educational facility should be prepared with the suitable furniture and equipment such as:

chairs and tables suitable for the age of the students, white boards, labs, etc.
7) The minimum classroom must be 2 square meters.
8) The minimum space per student for playing aims must be as followings:
- 5 square meters per KG student.
- 7 square meters per elementary school student.
- 10 square meters per and secondary school student.
9) 9- The maximum class size must be 20 students for KG stage , and 25 students for other phases.[14]

7.2 School site requirements

1) The minimum space area for KGs must be 1250 square meters.
2) The minimum vacuity area for primary schools should be 2750 square meters.
3) The minimum space area for precursory and secondary schools should be 3500 square meters.
4) The minimum space area for the campus of primary, precursory and secondary schools should be 8500 square meters.
5) The location of the school should not be neighboring or close to noise resources, commercial or industrial sites, and dangerous locations like petrol station that might impact the educational process.
6) It should be in an convenient , easily attainable location, with entrances not close to highways and main roads. It should also have sufficient parking spaces and school buses , and be away from anything that might jeopardize the safety of students.
7) The school building shall not be used for residential objectives to harmonize school staff and workers. A maximum of two guards can stay in the buildings during night shifts.
8) It must have parking area that is safe and great enough to simplify easy movement of cars and buses.
9) The school must gain a certificate from the safeguard Department of the General Directorate of the Civil Defense declare that the building concur the safety and security regulations. [14]

7.3 School building requirements

1) The school buildings should consist of one building and not more than three buildings in the same location including rooms for all intents. Buildings built for residential purposes like apartments and villas, and those formation of more than three structures cannot be used for educational purposes.
2) Elementary schools must have a minimum of six classrooms, a science laboratory , art room, gymnasium, praying room, nurse / first aid station, major office, staff room, stock piling room, reception area, guard room and toilets.
3) preparative and secondary schools should have three labs (biology, physics, chemistry).
4) Classrooms and educational services rooms should be quaternary with four parallel aspects to allow for good view for all students.
5) Using wooden framework for educational purposes is forbidden except those with permission from the General Directorate of the Civil Defense.
6) It must have activity rooms and halls convenient to the educational phase.
7) The number of managerial staff in the school should be commensurate to the number of students. A detached room should be allocated for each of the principal, vice-principal, secretary, warehouseman , and the social worker.
8) All classrooms, management and activity rooms must be clean, suitably lit, well-ventilated, and air conditioned.
9) Sufficient drinking water coolers should be supplied for students away from toilets – one refrigerator for every 50 students.
10) The building should have enough, well-ventilated toilets that are built in conformity with health regulations, and should be away from classrooms.
11) It should have a 15x15 m sunblind made of appropriate material.
12) There must be more than one emergency exit.
13) It must have a large praying room to accommodate the students.
14) Fully equipped cafeteria.
15) A appropriate outdoor waiting area for students.
16) A minimum of one outside sport court (with legal dimensions) for volleyball, basketball, or handball.

8 Features of good school building

1) Classrooms adequate number, and wide space, perfect lighting and ventilation.
2) Sufficient managerial rooms and rooms for the college.
3) Obtainable stadiums where necessary.
4) Rooms assist the educational process of the library, laboratory, and lounge activity.
5) There is a mosque that (the chapel) and sufficient toilets.
6) School location to be suitable and takes into account the distance from the noise of hazardous places and places.

9 Overview the fact of the existing school buildings and the problems faced

The current school buildings suffer from many problems, most of which belong to its lack of the foundations of good design, which led to the emergence of many problems, which in turn led to the emergence of some of the negatives on the performance of learners' level as well as the teachers, in return to educational policy, which was followed during the past era, it has failed in a lot of things that relate to education, and perhaps it's a systematic policy's main purpose is ignorance of the people and of course, this is done through the destruction and distortion of this vital sector, and emptied of its deep contents.

Perhaps one of the most important observations that we observe on school buildings in totality is the following :

1) There are some schools in places where crowds and noise, which may adversely affect the achievement of pupils and students.
2) Lack of classrooms in terms of widening the power, and the lack of tables and chairs compatibility with modern learning processes in accordance with the requirements of the grade, as well as other physical elements as a way of lighting, ventilation, and central air-conditioning means.
3) Lack of sufficient courts to perform physical activity in some schools.
4) Lack of some of the buildings for the rooms and places private multi-school activities that students practiced as an integral part and a complement to the educational process.
5) The lack of a complete, integrated and equipped libraries supply various means of books, magazines, the Internet, and cinema.
6) Some schools lack the classroom for teachers snugly, which in turn affect the performance of the teacher.
7) Design Bathrooms way that is comfortable and conducive to the spread of congestion.
8) There is not enough green spaces for the convenience of students and teachers alike.
9) Design school cafeteria primitive and confusing way, and stressful for pupils.
10) Lack of private theaters theatrical performances and educational activities carried out by the students and in the case of their existence, they used to use it is allocated uses.
11) Absence of special pray for teachers and students alike compartment.
12) There are some schools in an environment lacking safety standards because of its proximity to the power stations or the presence of radio stations over the roofs of schools.
13) Design schools in a way storey method followed cumbersome and does not give room for a follow-up to the classroom, as well as school supervision will be less than it is in the case of having all the classrooms in the bungalow geometrically comfortable and allows freedom of movement smoothly.
14) Lack of schools to private shelters resorted to in cases of risk, whether in war or other natural disasters.
15) Lack of schools for urban design that reflects the Islamic and Arab identity
16) Lack of medical clinics equipped with mini to provide the necessary health services to students.
17) Lack of parking for employees of school building.
18) Do not multiplicity of squares for a rest stop students, especially in the case of a co-educational schools and stages there problems result from mixing between students in different age groups among them, as well as gender differences, we find the multi-stage school in one period, and also mixed, which will result in some problems and behaviors of others positive. [4]

10 THE NEED TO BUILD A SYSTEM

Where through the work of the questionnaire and access to information on school buildings found that all school buildings need to have an administrative system and a program that adopts the process of assessment and determination of work powers and can be used by all persons working in school buildings and specialists for the purpose of making appropriate decisions and away from personal decisions that are not based on Something fixed.

11 ELEMENTS OF THE PROPOSED SYSTEM AND MATHEMATICAL MODEL

The structure of the proposed system requires knowledge of the components and elements of its construction in general, where the system consists of three basic elements agencies:

First: Inputs: The first component of the system that represents the interaction between elements and components and represents the main factors affecting the establishment of schools.

Second: The processor: It is the element responsible for converting inputs to outputs through interviews and questionnaire to achieve the desired objectives.

Third: Outputs: This component represents the final results of the proposed system, which includes the construction of a mathematical model for evaluation of school buildings projects.

12 STAGES OF BUILDING THE PROPOSED SYSTEM AND MATHEMATICAL MODEL

Phase 1: Data were collected from the experts through the questionnaire, the results are extracted in detail, the facts are obtained and the data is organized in the form of algorithms.

Phase 2: Data is programmed using the C # Sharp programming language. This is the first time such a programming language has been used to build a mathematical model for the project management engineering The algorithm for the proposed system for obtaining the school building assessment software was then carried out through a number of steps, illustrated in Figure 1 below, to reach the objectives of evaluating the school buildings.

Phase 3: Evaluation process for the program and the proposed system for the study and it's testing

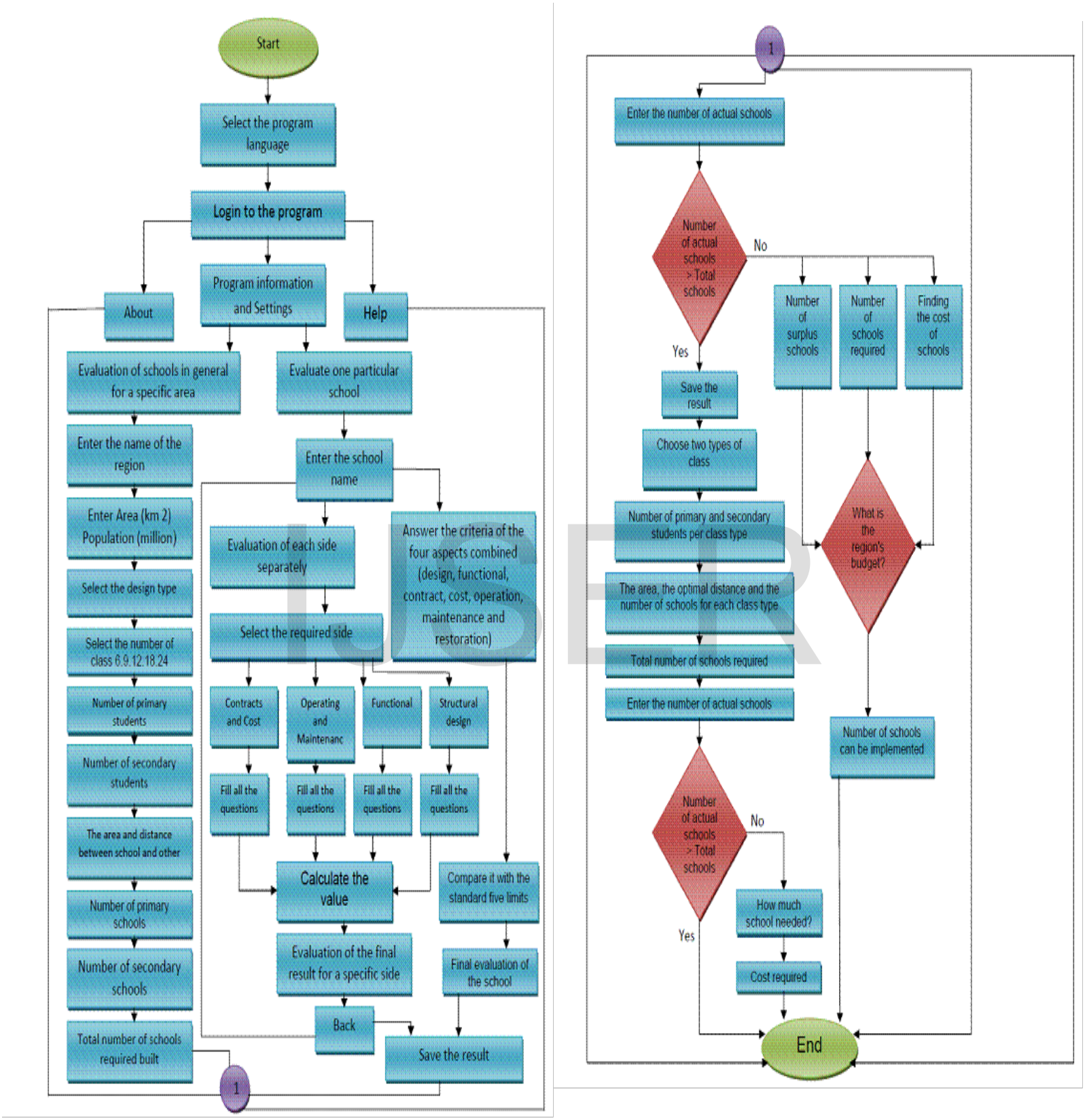

Figure 1 Computer system flow chart

13 PROPOSED SYSTEM FOR EVALUATING SCHOOL BUILDINGS

After determining the four basic aspects affecting the con-

struction of school buildings, determining the main factors of each worker, the weight of their impact and the necessary treatments, the proposed system was constructed in two parts. The first is to evaluate the school buildings projects in general for the governorate or the educational area, And to find out the number of schools to be built, to find the optimal distance between schools and others and compare them with the number of schools actually available and determine the number of schools the actual need and how much cost by the number of classrooms to be built and then the introduction of the budget and Knowing the number of schools to be constructed according to the available budget, and the second part is to evaluate the school in particular in terms of structural, design, functional, contracting, cost, operation and maintenance, whether conforming to the specifications and suitable or not, and evaluating the school building as shown in the flow chart of the algorithm Figure 1. It will be explained later in this chapter in detail.
After evaluating the factors in the sides, the evaluations are treated with the standard weight of each factor obtained from the questionnaire results and treated according to the following equation:

$$G = \sum_{k=1}^{n=53} E * H \qquad (1)$$

G= Final assessment Grade
H= It is entered by the resident as described in chapter Four table 4-29 Degree of assessment (0-100)
n= The total number of factors for all four sides
The Percentage of the design structural side was 40% of the total number of factors with 21 factors, the functional side ratio was 37%, the factors were 18 workers, the contracting and cost side was 11% with the number of factors 6, and the operation, maintenance, demolition and restoration side was 12% With a total of 8 factors, bringing the total factor to 53.

If we want to evaluate only one school, such as the functional side, for example, we enter the icon for evaluating each side individually, where the ratio of career 37% with 18 workers turned to 100% and compared with the five boundaries and evaluation of the building only functional and so on the rest of the sides.

14 Computer Program System and Work Steps

In order to achieve the best results, a computer system was built to be more effective in time and reduce the effort in lengthy calculations. It provides a database of school building projects and the evaluation of the school from all aspects of construction, design and functionality and the actual need for the number of schools needed and the number and cost of classrooms.
The system can therefore be used to analyze, facilitate and improve project management in school buildings and educational planning institutions. The system is designed with C # Sharp language. Works on Windows system (32 and 64 bit) and the proposed system is flexible, easy to use.

15 How to use the School Evaluation Program:

1) The interface of the components of the divided system will then be divided into two parts, one for the evaluation of the one school in particular from all aspects of structural design, functional, contractual, cost, operation and maintenance and the second evaluation of the schools in the region in general and as shown in figure 2 below:

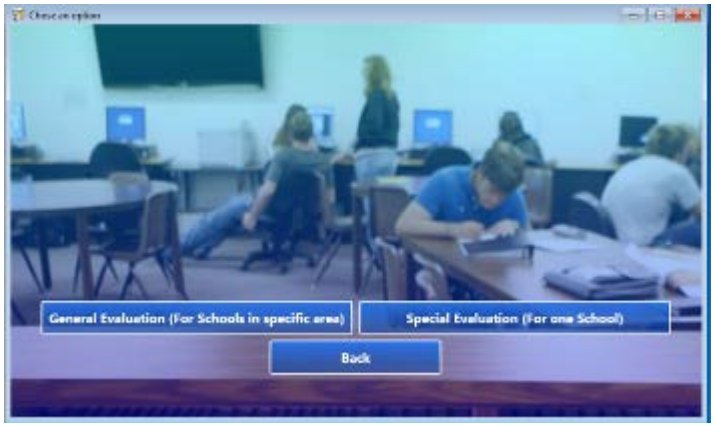

Figure 2 System main interface

2) After selecting a special Evaluation for one school, the following page is shown in Figure 3
Where we note that in this interface we can enter the school name that we evaluate and see previous schools that have been evaluated and the evaluation of the school in terms of all four sides evaluated as a whole or by each side alone and calculate the result and save or return to the interface before.

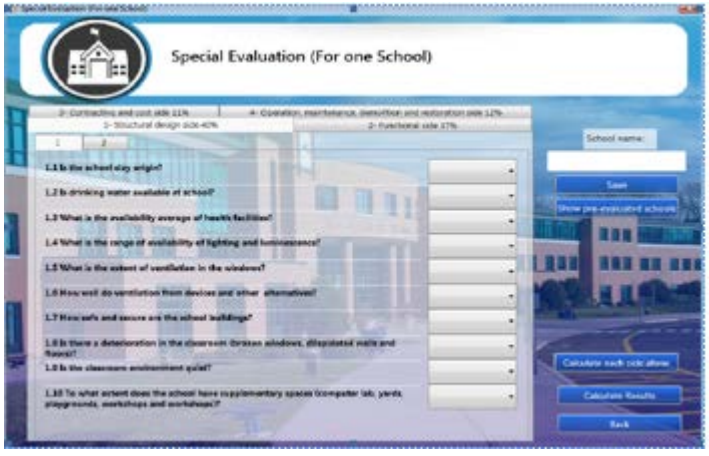

Figure 3 Special Evaluation School interface

3) The interface of the calculation of the assessment of one school from all four Sides is illustrated in Figure 3 above, where we begin to evaluate the structural design of 21 workers by choosing one of the five options (bad, acceptable, Middle, good, very good) and the ratios before each of these The choices range from 0 to 100, If we assume, the

mean for the fifth question is chosen, where X9 is 40-60 where the center is The class has 50 and the weight of X9 is 2.7 and it multiples 50 * 2.7 and so on for the rest of the answers to collects all of 21 workers and then we fill all other Sides consisting of 53 workers and collect appears to us the result of the 100 and compare them with the five border.
If we fill all the factors for all Sides and choose (very good), the school building should also be Very Good evaluated, as shown in Figure 4

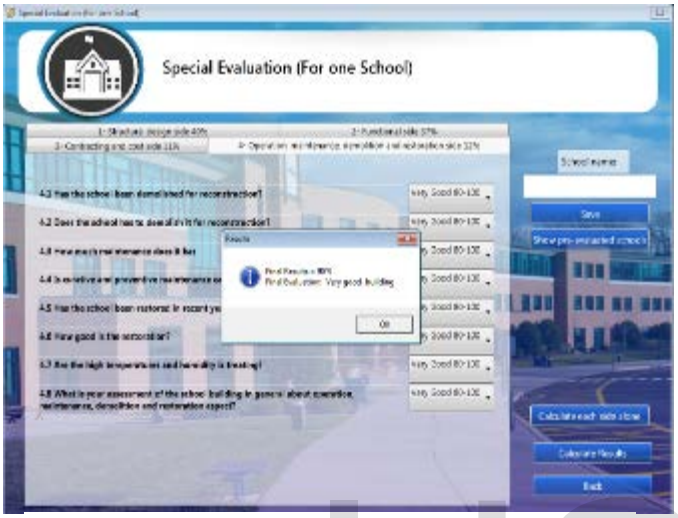

Figure 4 Evaluation four aspects interface

4) If we entered the interface for the evaluation of each side separately as in Figure 5, for example, if we want to evaluate the school from the functional side only press on the interface of the functional side, where only show the factors for this side of the number of 18 factors and fill all the questions of one of the five options If we choose the middle grade for all the factors, the evaluation of the building is shown to be medium in functional terms and as shown in Figure 6

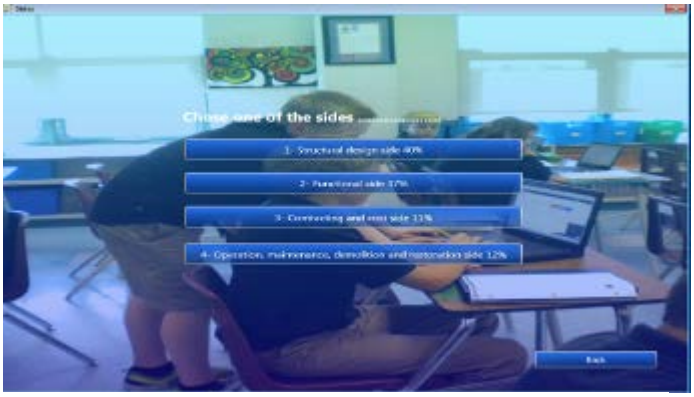

Figure 5 Interface for Evaluate one side separately

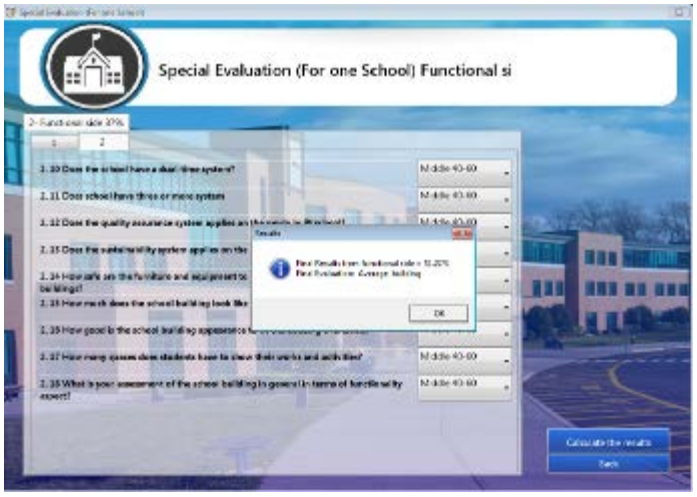

Figure 6 Interface for Special Evaluation Functional

Where we note from the figure that the result showed a medium amount of 51.22% as the rate of impact is 37% of the total so we chose the average so that the class center is 50 who shall beat all the weight of these factors 18 special functional aspect * 0.5 average class center and then collects The result is divided into 0.37 and its total weight is 100%, 51.22%, and so on for the rest.
If we look at Figure 7 below when evaluating the contractual side and cost, the first question is that there are only three levels starting from the average where it was considered that there are critical factors that must be no less than the average until the required assessment. If there is no financial allocation, we can evaluate this Side, so give the least evaluation of it is average, there must be an allocation until the rest of the questions and evaluate this Side.

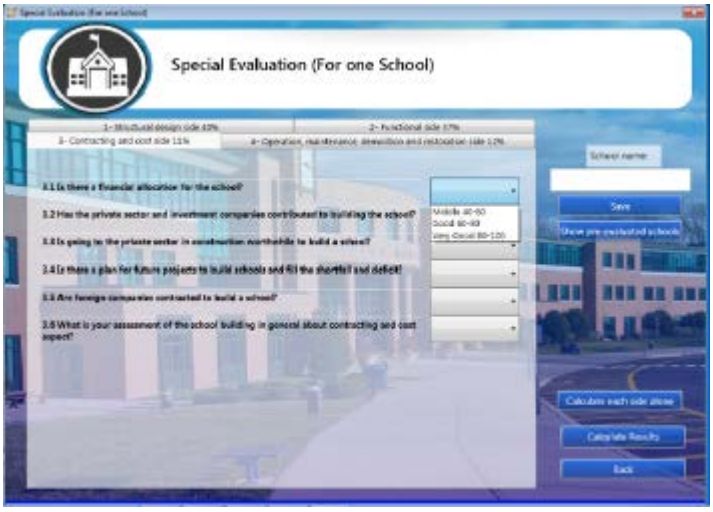

Figure 7 Interface for critical factors the contractual and cost side

5) In reference to the front, which was in Fig 2 and when

the pressure on the evaluation of schools in general in the region shows the following interface is shown in Figure 8

Where we note from the figure that it needs to enter the name of the area to be evaluated and its area in square kilometers and the population of one million people and then choose the type of design available or required for schools in the region and types (closed, U-shape) and the introduction of the number of classes of the five types (6, 9, 12, 18, 24) class.

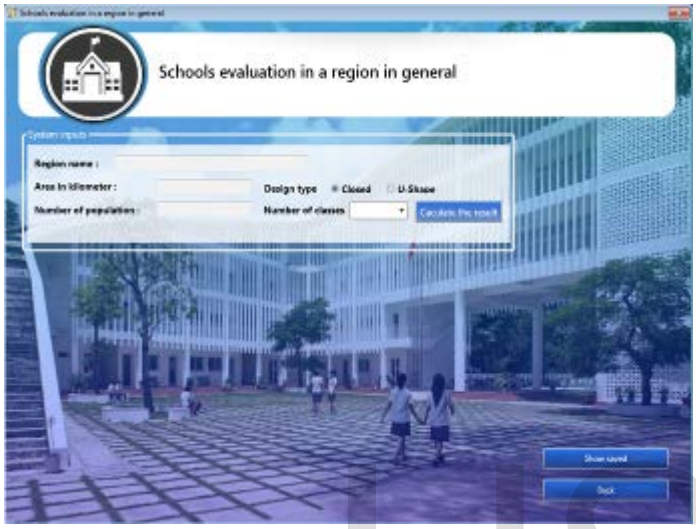

Figure 8 Interface for School Evaluation in general

If we enter the area of 30 km2, the population is 2 million, the type of design is closed, the number of rows is 9 grade schools, and we press the calculate result button, which will calculate the number of primary students as a percentage of the total population and the number of secondary students depending on the number of primary students The best distance between school and school based on the total area, number of population and coefficient by type of five grades is shown in Table 1 and then calculated the number of primary and secondary schools to be built and based on the total area entered and optimal extracted and according to the equations below.

Where the number of primary students = 20% population Number of secondary students = 10% Population Optimal Area = Factor by Type and Number of Rows * Total Area in Square Meters / Population per million people. Number of primary schools = total area in square meters / optimum area

Number of secondary schools = number of primary schools / 2

Assuming that the most appropriate number of students per class is 25 students that any school row 6 is made up of 150 students, and so the rest on this basis have been developed coefficient of all Class type as in the following Table 1

Table 1 Factor for each Class type

No. of Class	Typical number of students	Factor
6	150	0.075%
9	225	0.1125%
12	300	0.15%
18	450	0.225%
24	600	0.3%

Where the above coefficients were calculated by applying equation 5 and finding the optimum area. Assuming that the number of students is typical and dividing the total number of students on the model, we calculate the number of schools and then go to equation 4 and calculate the coefficient as a percentage.

To apply the equations above as follows:

Equation 2 is the number of primary students where we multiply 0.2 * 2000000 and equal 400000 as well as calculation of the number of secondary students of equation 3 and equal to 200000 and then apply equation 4 where we chose the number of Classes 9, That is , the coefficient is 0.1125% * 30000000 / 2 and equal to 16875 square meters the optimum area we root and equal 129.9 meters the optimal distance between school and then apply equation 5 where we calculate the number of primary schools required to be built and equal to 30000000/16875 = 1778 and extract the number of secondary schools of equation 6 and equal to 889 and then collect the number Primary and secondary schools = 2667 is the total number of schools required to be provided as shown in Figure 9 below.

We then enter the number of schools actually available in the area and assuming that the number of actual schools is 2,660. Therefore, 7 schools have to be built and cost 7 billion. The cost is calculated on the basis of the type of design as shown in Table 2 below and Figure 10.

And we are entering the budget available to build the school and on the assumption that the financial allocation is 5 billion so we can build schools number 5 of 7 is required type of design is 9 Class closed Design as in Figure 11

Table 2 Cost based on design type

No. of Class	U-shape Cost	Closed Cost
6	500000000	750000000
9	750000000	1000000000
12	1000000000	1250000000
18	1500000000	1750000000
24	2000000000	2250000000

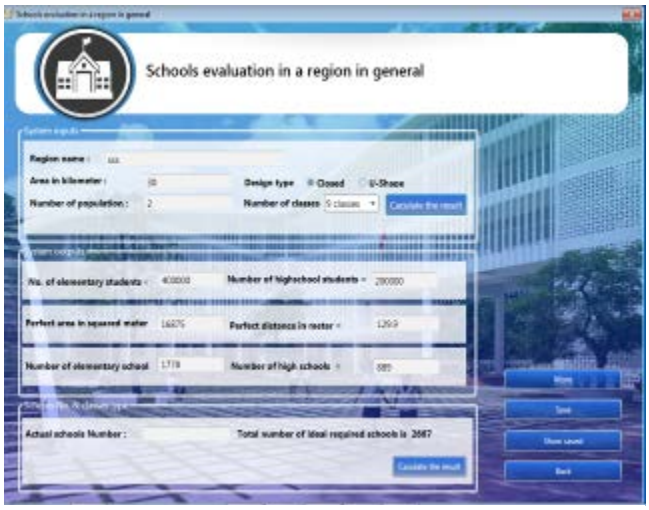

Figure 9 Interface calculating the number of schools and students need actual and optimal distance

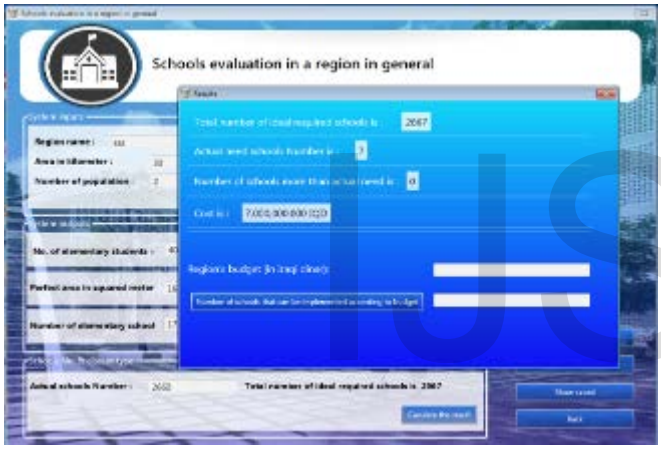

Figure 10 The interface to calculate the number of schools needed to build and cost

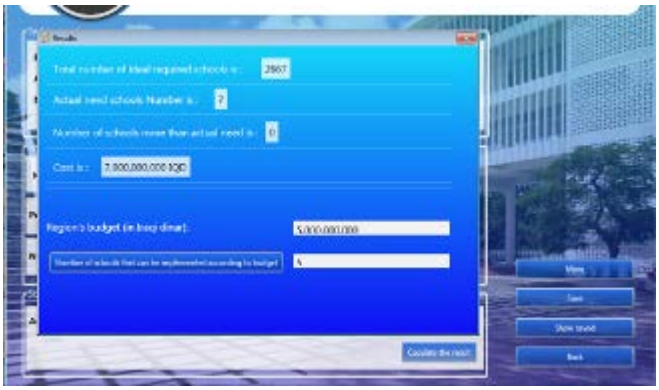

Figure 11 Budget interface and calculate the actual number of schools that can be built

If the number of actual schools is greater than the total number required, for example, 2700 schools are available, where we do not need schools to build and the number of surplus schools is 33 schools and the cost is zero and as in Figure 12 below

Figure 12 The interface represents the presence of surplus schools

6) If we want to design schools of two different types, we click on the more button. The following screen is shown in Figure 13

Figure 13 The interface design schools of two different types

Where we request the introduction of two types of Classes to be created and the proportion of each type as needed and the choice of type of design where we enter the first type, the establishment of schools 18 Class by 40% and the second schools 12 Class by 60%, which should be the total ratios of 100% also give us the number of students per Type, distance, optimum area and number of schools to be built for each type and total number of schools required, as shown in Figure 14 below

Figure 14 The interface to calculate the number of schools and students and the optimum distance for two types of classes

Where the optimal area is calculated according to equation 4 and according to the coefficient for each Class type and the number of schools and according to equation 5, the percentage of each Class type is included as follows:
The number of primary schools for type 12 Classes = 0.6 * 30000000/22500 = 800
The number of primary schools for the type of 18 Classes = 0.4 * 30000000 /33750 = 356
Where the number of schools to be built is 1734 schools. If we assume that the number of schools available is 1700 schools, the need is 34 schools at a cost of 493 billion and as follows:
0.6 * 34 * 1250000000 + 0.4 * 34 * 1750000000 = 49300000000 as in Figure 15 below:

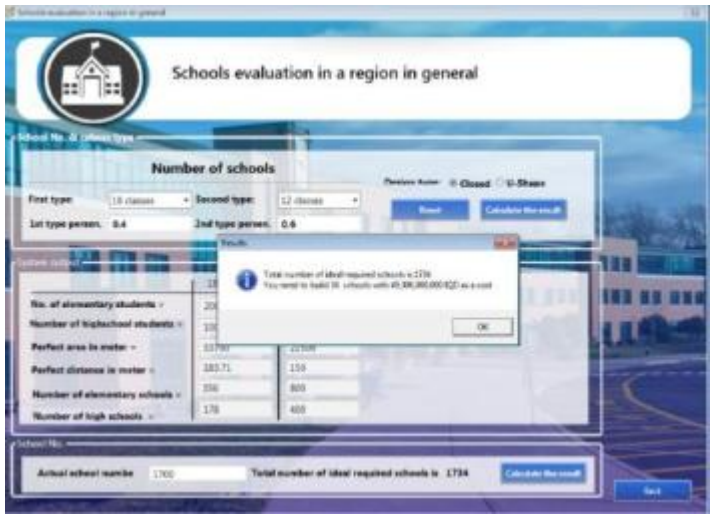

Figure 15 The interface of the number of schools need to be built and cost for two types of classes

If we assume that the number of actual schools is 1755, we will be shown that there is no need to build schools and their cost is zero. The surplus schools are 21 schools and as in Figure 16
7) If we note Figure 17 below, we find that the population is 1 million and the area is 10 km2. We chose a number of small classes, for example 9 classes. as the area is small, the program will give a red message indicating that it is best to use large number of schools to accommodate the population.

Figure 16 The interface of calculating the number of surplus schools for two types of classes

Figure 17 The message illustrates the use of a big number of Classes

8) Population density was adopted as an important factor in the application of the program as the population density is equal to the number of population per million people divided by the area in square kilometers as follows:
If the population density is less than or equal to 0.2, this means that the ratio is balanced between the population and their distribution on the area and gives us results
If the population density is greater than 0.2, there is an imbalance between the ratio of the population to the area,

where we receive a message indicating that the ratio is unreasonable and wrong and does not give you results as in Figure 18 below, as follows:

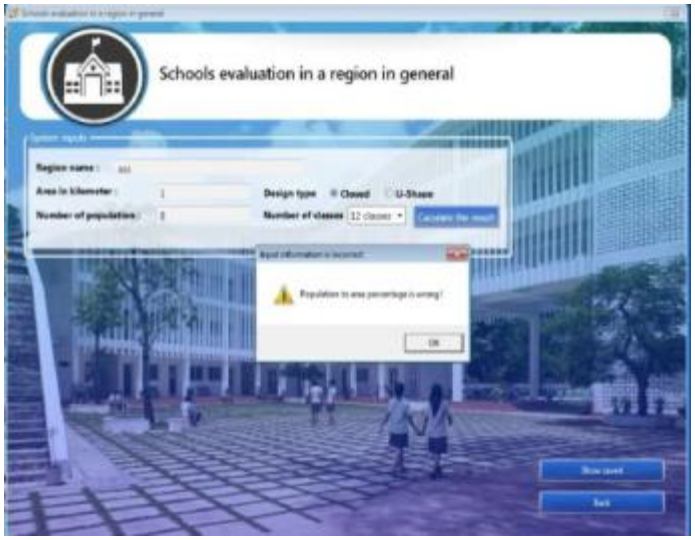

Figure 18 The effect of population density in the evaluation and accounts of schools

Where we note from the figure that the area of the area is 1 square kilometer and the population is 8 million and the division of the population on the area, the population density is 8 / 1 = 8 > 0.2 This is not acceptable, so the message shows that the ratio is wrong.

Evaluation of the proposed system for school buildings

In order to determine the success of the program in reaching the goal set for it, the evaluation of the projects of school buildings and the feasibility of future projects for the school buildings, a questionnaire was prepared for the program and its contents. The questionnaire was selected with the size of 25 people from engineers and technicians specialized in the implementation, design and work in school buildings projects and holders of a bachelor's and master's degree and experience. Table 3 shows the results and validity of the questionnaire.

Table 3 shows that the largest percentage of responses is based on the good and very good level of 82.4%. This indicates that the program has benefited from the general benefit of improving the performance of school buildings as well as its applicability, application, ease, comprehension and comprehensiveness in terms of the information contained therein, as well as its clarity and flexibility. any changes and the possibility of its adoption in the evaluation of school buildings and its comprehensiveness of the factors in all aspects of the school project and its accuracy and importance and achieve the objective for which it was developed.

Table 3 Verification and validation of the proposed system

item	Rating element	Level of the assessment				
		Feeble <60	Passable 60-69	Good 70-79	Very good 80-89	Excellent 90-100
1	The public benefit of the system in improving the performance of the implementation of school buildings projects in Iraq	-	-	13	8	4
2	Usability and application	-	-	10	10	5
3	Ease of use and understanding of the system	-	-	5	17	3
4	Its comprehensiveness in terms of information and the factors contained therein	-	-	17	6	2
5	System clarity and flexibility	-	-	12	9	4
6	The possibility of its adoption by application in the evaluation of school buildings	-	-	6	18	1
7	Extent of the program coverage of the factors within the aspects (structural design - functional - contracting and cost - operation, maintenance, restoration and demolition)	-	4	11	6	4
8	The accuracy of the software in the evaluation of school buildings projects	-	-	10	10	5
9	Has the program achieved its objective?	-	-	3	16	6
10	The importance of the program for the purpose of reducing problems related to school buildings	-	-	8	11	6
11	Total		4	95	111	40
12	the percentage %	0	1.6	38	44.4	16

15 Conclusions

The researcher reached the following conclusions:

1) The absence of System or a mathematical model to evaluate the establishment of school buildings projects.
2) Lack of studies on the building of the school from the structural and design aspects and contracting.
3) Lack of interest in school buildings as an essential element of infrastructure.
4) The existence of a mathematical model for evaluating schools reduces the problems related to them and addresses them.

16 Recommendations

1) The need to pay attention to school buildings as a fundamental element in any country.
2) Development of educational buildings commensurate with the purpose for which it was built.
3) Implement the quality system and sustainability to promote the value of education.

17 References

[1] Basima Alwan Hussein, M. Fouad Thomas, 2009, "The Evo lution of Education in Iraq", Directorate General of Educational Planning, Educational Studies, No. 6.

[2] Gahala, J; 2001 "Critical Issue: Promoting Technology Use in School", North Central Regional Educational Laboratory,

An article available through: WWW. ncrel, org.
[3] Watanabe, A. and Hosoda, T; 2005 "A precedentent Case Study on Environmental Education in School Building Sustainable Design of School Building in the USA UK", The 2005 world Sustainable Building Conference in Tokyo, sep.
[4] Al Shibli, Fathia Salem Mokhtar 2012, "Specifications of a Good School Building", a research paper presented at the First National Education Forum.
[5] Nair, P; 2004 "Planning Technology Friendly School Building" An article available through:WWW.designshare.com
[6] PSNC, 2000 "Making Current Trends in School Design Facilities" Department of Public Instruction, Public School of North Carolina.
[7] Qasmi Shawki, 2009, "School Building and its Role in Upgrading" Paper presented to participate in the Second National Forum on: The reality and prospects of reform of the educational system between local experiences and global models, Mohammed BoudiafUniversity,
[8] Saleh Mohammed bin Abdullah, 2000, "Designing Boys Schools in Saudi Arabia with Environment and Climate", Future School Seminar.
[9] Al-Bohey, Farouk Shawqi 2000, "Educational Planning, its operations, its entrances and its connection to development and the changing role of the teacher", Dar Al Maarefa, Alexandria.
[10] Al-Taher, 2007, "Study on the concept of school building"
[11] Kurdia, Mohamed Nihad 2014, "Design considerations for the school building, the cost of construction, institutionalization and operational model in southern Turkey and another inside Syria", the Syrian Center for Research and Studies.
[12] Alkholousi, 2005, "Study on the importance and characteristics of the classroom"
[13] Ahmed Yousif Al-Omari, Tara Abdel-Moneim, 2013, "Rehabilitation of Iraqi Schools in accordance with the Requirements of Social Sustainability", Architectural Engineering, Journal of Engineering, Mosul University, Iraq, No. 19.
[14] "Standard and Requirement for School Buildings" Supreme Education Council, 2010.