Impact of Problem based Learning in Architectural Education - Basra University as a Study Case

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Abstract -   *The third millennium has witnessed a vast and rapidly evolving revolution of knowledge and technology that has brought about many local, regional and global changes and has contributed to defining the features of the field of education. These changes have forced educational institutions to respond to them and have led to adopt modern methods and strategies to cope with and keep up with these changes as well as providing the best in this field. This, in turn, has been reflected in the development of education, which does not stop because there are convictions that a real renaissance in any country comes only with a true educational renaissance. Good education leads to a good investment and a great renaissance. Therefore, thought is being given to changing educational systems and moving from traditional, teaching-based education as the main and sole source of information to education in which teaching roles are supervisory, directing, facilitating, assistant, and complementary to modern teaching strategies. Thus, the research sought to explore the possibility of using the Problem-Based Education Strategy (PBL) as an alternative strategy to what is used in education in the specific departments of Architecture Engineering - Basra University. There is a cognitive lack in determining whether the Problem-Based Education Strategy (PBL) can be used effectively in architectural education at Iraqi universities in general and the University of Basra in particular. By highlighting the research problem, the objective of the research has been established, "Research seeks to explore the possibility of effectively using the Problem-Based Education Strategy (PBL) in architectural education. The achievement of the goal required that the theoretical framework be established, besides, in the light of the research hypothesis, which stated: "The Problem-Based Education Strategy (PBL) can be used effectively in architectural education and its effectiveness varies depending on the type of study." The research adopted an analytical descriptive approach based on a set of quantitative questionnaires, including members of the teaching staff of the Department of Architecture Engineering of the University of Basra, to verify the compatibility of this strategy with their vocabulary and their teaching experience. The research results almost varied the compatibility rates with the problem-solving hypotheses for study objectives provided for the study subjects within the curriculum, but over 50% according to academic vocabulary. Moreover, diagnosing several hypotheses that have very high compatibility rates above 60%, which confirms the possibility of using this learning strategy and solving problems for the cognitive objectives of that academic vocabulary. Furthermore, diagnosing several hypotheses that have very high compatibility rates of more than 60 percent, which confirms the possibility of using this learning strategy, and problem-solving for the cognitive objectives of that academic vocabulary. Besides, the researchers concluded that this strategy agreed with most of the academic vocabulary within the curriculum of the Department of Architecture - University of Basra. Also, the research concludes a set of recommendations, the most important of which was the possibility of relying on the problem-based learning strategy in architectural education, given the support demonstrated by the findings of the research for the PBL mechanisms and the verification of the cognitive objectives of the study.*

Key words: learning - problem-solving strategy - architectural education – teaching.

Research problem: There is a cognitive lack in determining whether the problem-based learning strategy (PBL) can be used effectively in architectural education at Iraqi universities in general and Basra University in particular.

Research objective: The research seeks to investigate the possibility of using the problem-based learning strategy (PBL) effectively in architectural education.

1.INTRODUCTION

Learning is a human process aimed at helping students at all levels to acquire knowledge and science to achieve a comprehensive and integrated development of personality that affects all aspects of their development, including physical and mental development. Teachers' abilities play a key role in this through the creation of a climate, a suitable educational environment, and teaching methods that enhance the student's self-confidence and open the way for better educational achievement.

Thus, those involved in educational matters in all fields must undertake studies and research to learn about the latest strategies, methods, and teaching methodologies, especially those in which the student is an active participant within or outside the class. In addition, their role in the dissemination of scientific and technical culture, which has a particular role in the evaluation of student culture and thus of society in general, scientific culture has become an imperative for all as the centerpiece of progress and development and a

component of public awareness in social, cultural and intellectual formation.

Considering one of the most important fields of knowledge: teaching methods and strategies, whereby those involved in teaching adopt interactive methods that make the student an active and essential participant in the educational process, besides, being thought-provoking and developing, especially as we desperately need to develop thinking when we ask to increase their ability to solve problems, especially as we live in a world where information changes and regenerates.

Accordingly, the research is concerned with reviewing the teaching strategies adopted globally and prevailing in education at the national level and focusing on one of the most important strategies for exploring the potential for architectural education. This strategy increases the

1. Conceptual framework

a. Problem concept

Prior to addressing problem-solving, we must recognize the problem primarily as a concept. The word "problem" is not new. It often hits our tongues whenever we face difficulty with a goal we seek to achieve. Students who cannot understand their lessons face a problem, thus, when a person has a goal to pursue, but is prevented from achieving obstacles that they cannot overcome, there is a problem. Thus, there are several definitions of the problem, including:

Salah Abu Asad, 2010, defines the problem as a new and distinctive situation facing an individual who does not have a solution ready in time**. (Mosab Alwan, 2009)** defined it as a situation to which an individual needs to be resolved by using his or her mind and dialogue to reach the desired solution, that is appropriate to the situation to which he or she has been subjected. **(Faiz Dundish, 2003)** defined it as every emergency that intercepts one or more of an individual's needs and requires a solution. For any educational situation, every situation that takes the quantitative or symbolic image, and stands as an obstacle to the student, making some attempts to reach the right solution to no avail, but it has not yet lost hope of achieving its goal.

Cronbach defined the problem, quoting from **(Fayez Dandash, 2003),** who says, "Every situation is a problem for the individual when he needs to answer and he normally has no ready answer."

Ryan, 1999, defined the problem as a situation in which students feel that they are facing a situation that they may just be ignorant of answering, and they want to know the right answer. The whole curriculum has been structured in the form of problems, which means that the problem-solving method must be followed in teaching, and it may be in the form of subjects, some of which are taught by the teacher in the way of problem-solving. The teacher has an

student's participation mainly in the course of study and becomes the focus of the educational and learning process.

Thus, the role of the professor is limited to assistance and supervision only, and accordingly, the research problem has been formulated, which is "There is a lack of knowledge in determining the possibility of using the PBL strategy effectively in architectural education in Iraqi universities." Thus, the aim of the research has been formulated, as the research seeks to explore the potential of using the problem-based learning strategy (PBL) effectively in architectural education. Achieving the goal required, building a theoretical framework, in light of the main research hypothesis, which states that "it is possible to use the problem-based learning strategy (PBL) effectively in architectural education, and its effectiveness varies according to the study vocabulary and stage"

important role to play in selecting and presenting the problem appropriate to the level of maturity of students, which is associated with the subject matter, in a way that raises their enthusiasm and willingness to solve, or to answer, since, without students' sense of the problem and desire to solve it, this method of teaching does not succeed.

b. Problem-solving strategy Concept

They are those operations or steps that the individual takes, using his mental knowledge to reach (the required solution to the problem) **(Hassan Ali Salama, 1995, pg. 289).**

There have been many definitions of the problem-solving concept according to the different schools to which the researchers belong, in addition to the different research topics, and there is no consensus among educators on the concept of problem-solving strategy and how to apply this method in school, daily life and the levels of its application. Views differ between the old and modern concepts of problem-solving and the aims of this method.

Dzurilla & Nezu (1980) define problem-solving as the conscious level of processing of seized information aimed at identifying and discovering or inventing solutions to the problem.

Anderson (1980:21) defines it as a series of goal-oriented cognitive processes.

Dzurilla & Goldfried (1984:11) define problem-solving as a cognitive-behavioral process, whether apparent or implicit, where effective alternatives are based on learning with the problem situation, increase the likelihood of testing the most effective response among the primates. Besides, they identified the problem-solving strategy as a general adaptation strategy aimed at discovering effective solutions that contribute to facilitating and maintaining overall social efficiency.

Baron, 1989:7, defines the scientific method of problem-solving as employing several different strategies and skills using the principle of trying, and error to reach possible solutions by choosing one of the appropriate alternatives or solutions.

Also, in writing (How to Think), John Dewey provides an analysis of the mechanisms and paths of the human mind when one finds itself facing a particular problem in a confusing situation. Dewey sets out the functions of analytical thinking and the role of this type of thinking in removing the ambiguity surrounding the confusing situation or causing a satisfactory solution to the solution method.

Some educators define the problem-solving method as: "A method of scientific thinking based on conscious observation, experimentation, and information gathering so that the transition from the part to the whole (extrapolation) and from the whole to the part (conclusion) to reach an acceptable solution **(Al-Sakran 1989: 147)**.

(Muslim, 22:1994) defines problem-solving as a vital activity carried out by a human being at various levels of complexity, as well as a duty or a request to decide on a subject.

Gagne sees that problem solving is a pattern of behavior governed by laws, a process in which the individual integrates (Concepts) and (Rules) from his previous knowledge to be rules at a higher level that enable him to solve problems. Janeh views problem solving as the most complex form of education **(Dixson & Glover, 1984:18)**.

The tasks of learning to solve a problem generally involve a learning situation in which a student discovers a solution to a particular problem that usually allows many possible alternative responses or solutions, one or more of which may lead to an acceptable solution. That's why the problem-solving activities seem more complex than other educational activities. **(Nashwati, 1997:452)**.

(Zaytoun, 1998: 51) defines problem-solving as an attitude based primarily on the application of previously learned knowledge, methods, and strategies for solving previously learned, so that these knowledge and methods are organized in a way that helps to apply them to an unfamiliar situation, which selects from the previously learned knowledge and acquired methods and strategies for resolving one situation to be applied in another.

(Mahmoud, 2001:24) identified the ability to solve problems as a set of structured steps to find appropriate and sound alternatives to the problem to which a person is subjected, intending to adapt him in the area of his work and the reality in which he/she lives.

This method consists of taking one of the problems related to the subject of the study as its focus and starting point in the teaching of the subject by thinking about this problem and making the necessary procedures, collecting information and results, and then making appropriate proposals. The student has acquired scientific knowledge and has been trained in scientific thinking, which has led to the required development of his or her mental and practical skills **(Abu Jalala, 2001:105)**.

George Polya was credited with considering problem-solving strategies as a teaching method, where teaching methods are defined as the art of invention or discovery, therefore, are general strategies that help solve problems where problem-solving is a creative activity that is not always successful. The method of teaching is not the performance of skills that must be applied correctly, ensuring success **(Mohammed Kamel Mohamed Imran 2014)**.

The solution to the problem can also be defined as behavior-based primarily on the application of previously learned knowledge and methods and strategies for solving such knowledge and methods in such a way as to enable them to be applied to a previously unfamiliar situation so that they choose from the previously learned knowledge and acquired methods and strategies for resolving one situation to be applied in another. **(Zaytoun, 2003:283)**

According to Abdul Hadi, 2004: There may be innumerable problems in one's life, as in the student's case. There are problems related to the relationship of individuals with each other, problems relating to the understanding of perceptions, feelings, and emotions, and some of them relate to the realization of relationships and the acquisition and practice of skills, and others related to ethics. It can be said: Problem-solving requires scientific methods, whether direct or indirect, and the skill and capabilities to use the information to reach the desired solutions.

Thus, through submitting the previous definitions of a problem-solving strategy, it can be defined as "It searches for suitable alternatives to solve the problem faced by the individual for adaptation or to get rid of a specific problem, the researcher also defines a problem-solving strategy as a set of sequential steps to arrive at appropriate and correct alternatives to the problem facing the individual to adapt him in his environment and field of work, represented by thinking and organizing to achieve a specific objective"

c.   Steps to Problem-Based Learning

Problem-solving steps and their nomenclature vary from world to world. Although they disagree, they agree that the problem-solving process involves not only one work but also several interrelated actions or phases that require an individual to proceed according to particular

steps or stages. Some stages of problem-solving could be reviewed, the main steps and models are as follows:

1. John Dewey	One model that has had a strong impact in increasing the effectiveness and skill of problem-solving involves: 1. Problem Presentation. 2. Problem defining. 3. Generate assumptions. 4. Evaluate assumptions. 5. Pick the most efficient assumption. **(Al-Atari. (1999:61)**
2. Robinson & Anderson	It suggests that a person's ability to solve the problem gradually improves over time where steps include: 1. Reception (providing the person with information). 2. Memory helps to solve the new problem. 3. Examine the hypotheses and choose one of them. **(Al-Nabulsi, 1986:115)**
3. (Bootzin) and (Patterson & Eisenberg),	1. Define and accurately identify the problem where the success of this step entails the success of other steps. 2. Gathering information, accessing its sources, and exploiting the sources of the environment in which the individual lives, with a view to a better knowledge of oneself and available alternatives and choices. 3. Generate and evaluate possible alternatives and solutions and form hypotheses on the potential outcomes of each alternative or selection. 4. Selecting and applying a method of action, which is the practical methods and procedures that an individual is expected to exercise to control a problem. 5. Evaluation of results to determine the extent to which the objectives have been achieved and their success in solving the problem in whole or in part. 6. Repeat the process where necessary if objectives are not achieved. **(Bootzin, et al 1991), (Paterson & Eisenberg, 1983).**
4. **Kohler**	Kohler believes that problem-solving is a process of mental foresight that goes through the following steps: 1. Identify the problem. 2. The individual is mentally conducting several possible solutions. 3. One's Foresight to Think About the Solution.
5. George Polya	One of the most popular models that have had a significant impact on the teaching of mathematical problem solving includes four steps: 1. Understand the problem. 2. Develop a plan to solve the problem. 3. Implementation of the plan. 4. Solution review and validation **(Ismail, Al-Amin, 2001:249-250).**
6. **Frederick Bell**	1. Presenting the problem in general. 2. Reformulation of the problem by procedural definition. 3. Formation of alternative propositions and steps that are an appropriate way to deal with the problem. 4. Testing the hypotheses and taking the steps to obtain a more suitable solution than the alternative solutions. 5. Promote any of the most appropriate possible solutions or verify that one is correct. **(Al-Najjar, Akram, 1999, 43).**
7. **Meyer**	1. Translation: It requires linguistic knowledge that allows the students to understand the problem. 2. Integration: The student integrates each sentence into a coherent representation and has special organizational knowledge and identification of problem-solving. 3. Planning and follow-up: They require knowledge of strategies that

		focus on how to solve problems and develop a plan for the solution.
	4.	Solution Implementation: It requires the student to use procedural knowledge accurately and efficiently.

Table 1 Problem Solving Steps (prepared by the researcher)

3- Practical study and conceptual framework vocabulary testing

First: conceptual framework Curriculum

1. Mechanisms have been developed to test the research hypothesis that states (Problem-based learning (PBL) strategy can be used effectively in architectural education, its effectiveness varies depending on the type of study type and stage) by testing the conceptual framework and adopting the steps of problem-based learning to turn the objectives of lessons into problems and then into searchable hypotheses. Thus, hypotheses were put forward for a questionnaire based on the educational process (Educational Body) of the Department of Architecture of the University of Basra to obtain data regarding the use of the problem-based learning strategy in the curriculum vocabulary through the hypotheses put forward for each problem and use their views in the development of the educational process.

2. **Stages of problem-based learning (PBL)**

Step 1: Feeling and gathering information about the problem: with the help of students, the teacher identifies a particular problem and the study begins with the definition of the nature and parameters of the problem. Teachers help students gather information about the problem for research by asking a range of questions, and students will preferably write down the information they have gathered in a special paper. The collection of information serves to determine the characteristics and nature of the problem in question.

Step 2: Setting problem-solving hypotheses: The purpose here is a predictable, probable, or conceivable preliminary solution to the problem, the more the assumptions are, the more likely the solution will be. It is recommended to prioritize hypotheses as determined by students. The more clear and specific the hypothesis, the easier it is for the student to test its validity.

Step 3: Validation of the hypotheses: This requires conducting some activities and experiments to prove the validity or non-validity of certain hypotheses. The teacher may use logical proof (the use of contradiction or contrasting examples) to prove that some hypotheses are invalid.

Step 4: Results: If it is proven that one of the hypotheses provides a solution to the problem, it is used in the solution and formulated in a way that facilitates its use and interpretation, where it can be used in new situations. The solution is chosen through a discussion involving all.

Step 5: solution implementation: Students apply their findings to new situations both inside and outside the classroom environment, thus becoming the method of problem-solving within their intellectual stock.

Step 6: Evaluation: Evaluate the effectiveness and feasibility of the solution applied to the new problems.
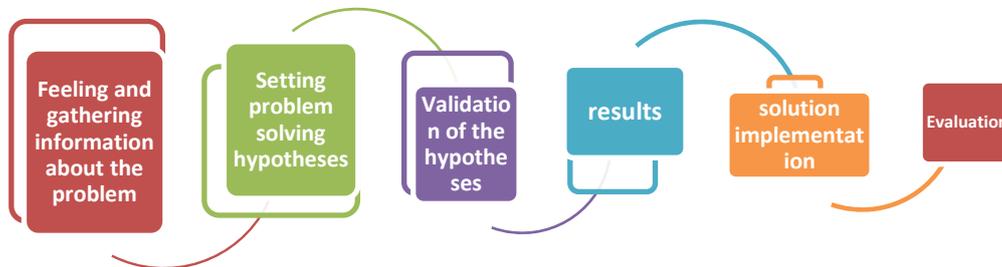
Figure 1: Problem-Based Learning steps

Second: the study community

The study community consisted of the faculty members of the Department of Architecture at the University of Basra, and the current research raised several questions through a questionnaire based on the

educational process (the teaching staff), which includes a set of hypotheses per objective of the curriculum vocabulary, which is converted to problems, and then researchable hypotheses by students to utilize the assessment results in formulating the architectural academic output through the use of the problem-based

learning strategy (PBL) in the architectural curriculum vocabulary.

4- Analyzing the questionnaire of the faculty members

The point of view of the teaching staff was surveyed to demonstrate the problem-based learning strategy implementation in the architectural study.

First: the targeted study sample

The study was conducted among the faculty members of the Department of Architecture at the University of Basra. The proportion of responses (88%) of the total number of members of the teaching body, 17 of whom participated in the questionnaire, in addition, 2 of which were neglected for lack of seriousness in answering so that the total number of SPSS-analyzed questionnaires were (15).

Second: The questionnaire objective

The extent to which a problem-based learning strategy can be applied to curriculum vocabulary in architecture engineering departments according to the views of the teaching staff of the Department of Architecture Engineering, Basra University.

Left column tables

Principles of art and architecture	Educational goals	Possible problems	Problem-solving hypotheses	Likert scale	Result
			Hypothesis 2 – The assimilation of things in nature and the sense of architectural space are developed through: -Perception of edges: the outer frame that defines shapes, and it may be two-dimensional or three-dimensional. -Perception of sizes: It distinguishes the space occupied by an object in the vacuum, and to paint it, the painter starts with the axis in the center of the object, and then draws the parts surrounding it. -Understanding Relationships: It is drawing several shapes next to each other and seeing them as one unit, and one group interacting with each other and uniting them together. -Distinguishing light and shadows: Shadow and light help to better understand the shape of objects or shapes		Agree, strongly agree 33.3%
	1- Introducing the new student to the basics of architecture and its connections with the rest of the various scientific fields.	1-What are the basics of architecture and its connection with other scientific fields?	1- Hypothesis 1- One of the basics of architecture is the suitability for functionality, and safety factor (structural durability). Among the fields and specializations that are related to architecture are: Civil Engineering: It is concerned with civil buildings. Interior design: It is concerned with interior appearance.		Agree 53.3%
			Hypothesis 2- One of the basics of architecture is aesthetic expression, creativity, and economy. the fields and specializations that are related to architecture are: Urban design: It is concerned with the design of streets. Islamic architecture.		Agree 50.00 / Agree 40.0%
	2-Developing the artistic taste of the new architecture student.	2-What are the things that develop architectural artistic taste and develop skills?	2- Hypothesis 1- Pausing (watching and meditating) Perception: The sense that we are in the face of a phenomenon, not a reality, where the aesthetic subject is visible rather than realistic.		Agree 53.3%

Right column tables (building materials / Computers)

building materials 1	Educational goals	Possible problems	Problem-solving hypotheses	Likert scale	Result
			Hypothesis 2 – Intuitive position: it depends on the immediate event and sudden realization, and not, as in science, on inference, proof, and rational research. Emotional empathy: the self is completely or partially mixed in the artistic work, and a kind of union and mixing always occurs between the viewer and the subject represented in his perception, contemplation, and listening.		Agree 53.3
	The aim is to introduce students to the various traditional building materials used locally and globally, with a focus on local building materials and associated construction (properties, linkages, and combinations of materials).	What traditional building materials are used locally and globally? What are their properties? And how is that material connected and mixed?	Hypothesis 1 – Bricks, concrete blocks, and stone. Bricks are characterized by thermal insulation and the ability to withstand any high compressive resistance, but it takes a longer time in construction and thus increases the cost. Concrete blocks give faster work, but their weight is large and the ability to transfer loads from the bricks is less. Bricks are bonded together with cement and sand mortar, with concrete blocks that are bonded with cement, sand, and stone, and cement and sand mortar are also mixed.		Agree 56.67
			Hypothesis 2- Thermiston and Iron structures The thermiston has a light weight, heat isolation, speed of operation, ease of carrying and cutting, but it is also weak in transporting loads. The iron structures are also characterized by their high strength to resist torque and strength and speed of completion, but they are very expensive. These materials are mixed. Thermiston is attached with adhesive or it can be connected with cement and sand or plaster and sand. Also, iron structures are connected by welding or screws.		Agree
Computers	1- Prepare students to handle computers and enhance their skills in line with the discipline	1- How are personal architectural skills supported by computer handling?	1- Hypothesis 1 – Skills are enhanced by working on architecture programs such as the (3D Max and AutoCAD).		Strongly agree / Agree 40.0%

Lower left table

	Educational goals	Possible problems	Problem-solving hypotheses	Likert scale	Result
of architecture.			Hypothesis 2 – Architectural personal skills are enhanced by drawing projects designed by hand with two-dimensional and three-dimensional architectural programs.		Strongly agree

first stage result					**45.10% agreed**
The second stage					

Education	Educational goals	Possible problems	Problem-solving hypotheses	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	The ratio Final result
Vocabulary									
Architectural Design	1-Teaching the student the axes of preparing analytical studies for the parts and components of the project, starting with choosing the site and ending with the symbolism of the project.	1-What steps should be taken before starting the project?	1- Hypothesis 1- 1- Studying the project program… its elements, components, and purpose. 2- Studies of the site and the environmental and climatic effects on the project.						Strongly agree 40.0%
			Hypothesis 2 – 1- Studying similar examples … similar projects. 2- Choosing the appropriate structural method. Studying the structural structure.						53.3% Strongly agree / 36.67% agreed
	2-Teaching the student how to deal with the strong determinants of the proposed sites according to the function of each exercise.	2-Are there limitations that are dealt with before the design process? What is it and how is it dealt with?	2-Hypothesis 1 – 1- Topographical characteristics of the site. 2- The natural components of the site.						46.7% agree
			Hypothesis 2 – Site Climatic characteristics. Urban site surroundings components. Building regulations and requirements.						40.0% agree

Lower right table

Architectural drawing	Educational goals	Possible problems	Problem-solving hypotheses	Likert scale	Result
	3- Teaching the student how to deal with functional and symbolic design problems for projects with different goals and locations.	3-How to deal with the functional and symbolic design problems of projects with different goals and locations?	3- Hypothesis 1- One of the tools that bring the designer closer to the solution closest to objectivity is the studies stage, which is supposed to be characterized by clarity of the approach and accuracy of the data, which later helps to criticize and analyze the final product (the credibility of the output based on the data). These tools keep us from the extreme limits (the designer's finite subjectivity on the one hand or reliance on previously tested circulating solutions - cloning - on the other). Therefore, on-site analysis and functional analysis are considered determinants of any design and it applies to any design within any idea.		Strongly agree 40.0%
			Hypothesis 2 – The symbolic analysis is related to the designer's privacy and the possibility of conveying a message to the recipient, i.e. the meaning to be reflected in the design.		40.0% agree
	1-Introduce the student to the principles of design, projection, and perspective through 2D and 3D graphics, shadow projections, and the basic principles of an architectural and interior perspective painter.	1-What are the principles adopted in design, projection, perspective (architectural, interior), and shadow projections?	Hypothesis 1 – principles adopted in projection and the internal and external architectural perspective are: 1- All parallel lines meet at a certain point on the horizon. 2- 2- All the oblique lines meet at the vanishing point on the horizon line. Casting shadows in perspective When there is only one light source, all shadows in the image will be from that source only From the point of the light source Draw lines on the edges of the box or desired shape.		66.7% agree
			Hypothesis 2 – the principles adopted in projection and the internal and external architectural perspective are: 1- All vertical and horizontal lines remain unchanged. 2- 2- The vertical lines converge further away from the eye of the beholder. 3- The upper surfaces get smaller the closer they are to the horizon line, and the side surfaces get bigger the farther they are from the vanishing point.		53.33% agree / Agreed

land drawing

2-Introducing the student to the methods of architectural presentation and production, and mastering at least one method well.	2-What are the methods of architectural presentation and production? How to reach the best way to show the architecture?	2-Hypothesis 1- Sketches, through artistic presentation	66.7% agree
		Hypothesis 2- Digital or physical 3D models	46.7% agree
1-Develop the student's skills in using watercolors, posters, pastels, and oil colors.	1-What is the best way to use pens, brushes, oil, and watercolors, and pastel colors to achieve the best architectural output?	1- Hypothesis 1 – In oil colors, we initially draw the shape with charcoal or a pencil, and charcoal is better because there is no lead material and it interacts with water colors.	Neutral 46.7%
		Hypothesis 2- The best way to use watercolors is to do a light sketch of the board to define the broad color area, background, detail areas, and areas to be left with a white background. A starting layer of the details of the drawings can be colored in light degrees of color, and when they are dried we paint, this method shows nice shades of the painting and is beautiful when drawing flowers. There are several useful techniques for creating different effects with watercolors such as color overlapping, surface wetting, spraying...	60.0% agree
2-Introducing the student to ceramic materials, sculpture, and mass.	2-How can a new architecture student sense mass?	2- Hypothesis 1 – By using materials used for incarnation like cork and clay.	40.0% agree
		Hypothesis 2- By making three-dimensional models through three-dimensional architectural programs.	33.3% agree
3-Identify the color wheel, components, divisions, readings, and means of implementation.	3-How are the colors from the color wheel used in free drawing?	3- Hypothesis 1- The colors are used from the chromatic circle, which consists of three main colors, which are red, yellow, and blue, and any other color formed by mixing the basic colors in different proportions.	73.3% agree

(overall: 48.89% agreed)

Construction of buildings I (solid system)

		Hypothesis 2 – Using the color wheel and using the color triangle on the wheel, the colors are mixed to get consistent colors.	53.3% agree
1-The student learned to prepare the necessary details for each stage of the design to be clear when implementing.	1-How are the details prepared for each stage of implementation?	1-Hypothesis 1- Creating detailed tables for each stage, estimating the quantities, units of measure, and the time required for completion, each paragraph is entered with the other by making a work progress table.	46.7% agree
		Hypothesis 2- During project implementation, individuals perform tasks, project progress information is communicated through regular team meetings, and it is worth noting that on any project, the project manager spends most of his time on this step. The project manager uses this information to maintain control over project direction by comparing progress reports with the project plan to measure the performance of project activities and to take corrective action as needed.	46.7% agree
2-The student learns construction processes and methods.	2-What are the construction processes and methods?	3- Hypothesis 1- Construction processes and methods Many construction processes and methods follow materials used for construction. For example, buildings or steel installations in which construction consists of ready steel clips that are mounted together with bolts.	53.3% agreed
		Hypothesis 2- Construction processes and methods Construction processes and methods for concrete structures, which are built from iron and concrete bars after forming their molds. The building or structural facilities may be built with load-bearing walls of bricks, concrete blocks, or any other material that is supported by a concrete foundation, or it may be just an installation as in prefabricated concrete buildings. Thus, the operations vary according to the building material and the type of constructor. It has structural systems of solid, structural, and veneer.	33.3% agreed

(overall: 40.00% agree)

3-The student learns the foundations and their details.	3- What are the types of foundations and their details?	3-Hypothesis 1 – types of foundations The separate or single foundations are square, rectangular, and circular in shape, it has a specific area (L * W) and is implemented to carry only one column. Common foundations, which are foundations bearing two or more columns, and are often shaped like a trapezoid or a rectangle	53.3% agreed
		Hypothesis 2 – Other types of foundations 1- Strip foundations: They are longitudinal foundations for carrying walls, fences, and others. 2- Mat foundations: It is a single base that bears loads of the installations, whether it is structural, bearing walls, or joints 3-columns of foundations: There are different types and shapes of them, and they are classified according to the materials into reinforced concrete piles, iron (steel) piles, wood piles, and others, and they are classified according to the method of implementation into drilling methods and piles.	46.7% agree
4- The student learns how to bond bricks.	4- What are the types of brick binding?	4-Hypothesis 1 – There are several ways to bond the bricks: 1- English bond 2- German bond (Flemish bond). It is divided into an even and odd German bond. 3- Bonding via kerosene.	40.0% agree
		Hypothesis 2 – There are several ways to bond the bricks: 1- hollow bond 2- Garden wall bond. 3- Pattern bond.	Agree
5- The student learned to roof the holes in the brick walls.	5-How are the holes in the walls being roofed?	5- Hypothesis 1 – Roofing openings in walls This is done by making a concrete parapet that protrudes from the face of the wall towards the outside at a certain distance. The openings are roofed by making a bridge over the opening and covered with iron.	53.3% neutral
		Hypothesis 2- By placing sections of iron, such as a section, L or I, to make the bridge and build it over it. Wood clips can also be used.	neutral

6- The student learned brick floors and ceilings (Al-Aqdah).	6-What are the other ways of roofing spaces other than reinforced concrete systems?	6- Hypothesis 1- Aqdah ceilings. Sandwich panel ceilings (a modern method that requires sections of iron under the sandwich to be strong)	neutral
		Hypothesis 2- 1- Wooden floors and ceilings. 2- Structural ceilings. 3- Spiral roofs.	33.3% agree
7- The student learned reinforced concrete floors and ceilings.	7- What are the types of reinforced concrete floors and ceilings, and what are the advantages and disadvantages of each type?	7- Hypothesis 1- Types of reinforced concrete floors and ceilings, their advantages and disadvantages: 1-Beam slab: a floor with bridges underneath, which can reduce its thickness and have good resistance to power loads, but due to the presence of bridges, the dead load and the cost increases, and the method of implementation is more difficult than others in terms of building the mold. 2-Flute slab: A type of ceiling or floor that does not contain bridges, but is based on columns directly, so it is called (flute slab) characterized by being suitable for large spaces and the ease of forming molds for them, but its thickness is slightly greater than the first type.	Agree
		Hypothesis 2- 1-Ribbed ceilings or floors (waffle slab). These ceilings are used for large spaces and when the live loads are relatively high, and they work from small lintels three times their height and width. The existing voids are used for the passage of pipelines and ducts for service channels. 2-Concrete ceiling or floor with metal lintels. It consists of a reinforced concrete block (12-15) cm thick, carried by metal lintels into an (I) segment. This floor is very similar to aqeedah.	Agree
8- The student learns materials for finishes resistant to environmental factors in ceilings (surfacing).	8-What are the materials that resist environmental factors in flattening?	8-Hypothesis 1- Materials that resist environmental factors in flatness. Many materials are used for flattening, including flancott, tar, iso cam, polyethylene (nylon), dry soil, sand, and sometimes Kashi mosaic.	40.0% agree
		Hypothesis 2 – The materials that are resistant to environmental factors in flattening are cold flancott.	53.3% Neutral

Axis	Objective	Question	Hypothesis / Content	Result
History of Architecture I (Ancient Egyptian and Mesopotamian Architecture)	1-The student identified the most prominent qualities, characteristics, and architectural and urban characteristics of the Mesopotamia civilization and the Nile Valley.	1-What are the most prominent features and architectural characteristics of ancient Egyptian architecture and the architecture of Mesopotamia?	1- Hypothesis 1 – 1-Egyptian architecture in its oldest eras is characterized by simplicity, immensity, and grandeur that feels strong and stable and is manifested in the spirit of simplicity. This simplicity was coupled with beauty and harmony as well as with extensive science of construction engineering, calculating pressure, the resistance of objects, and other conditions of architecture. 2-The Egyptians turned a new direction, which is to taste nature, life, and movement, and we can see that new direction in their buildings and statues.	40.0% agree
			Hypothesis 2 – 1-The Egyptian architecture is distinguished by the establishment of spacious halls and tall columns, and they resorted to making the central columns much higher than the side columns, and as a result, the ceiling on the sides was lower than in the middle. Thus, light enters through the vents, and that light is very bright at the vents, and then spreads to the rest of the temple. 2-The most important features of the architecture, the increase in the thickness of the supernatural walls and their inclination to the interior from above. The walls were built with a thickness that was lower in width as the construction rose, so that the surface of the wall remained perpendicular and the outer surface became tilted, increasing the strength and stability of the wall.	Neutral 36.67% / 40.0% Neutral
Logic and Design methodology	1-Making the student aware of what architectural design is and the multiple disciplines and subjects that play an important role in the design process.	1-What is architectural design? What are the specializations that affect the design process?	1- Hypothesis 1- Architectural design is one of the technical means that are used in creating the first designs for architectural facilities, whether for housing or commercial and professional use.	neutral
			Hypothesis 2 – Architectural design is a set of stages that depend on drawing and planning to formulate ideas and images used in establishing the art of architecture.	41.1% agreed / Neutral
	2-The student learns the basic design principles, processes, and factors involved in the design process.	2-What are the basic design principles and processes involved in the design process?	2- Hypothesis 1- The processes involved in the design process 1-Attracting and collecting information, which is the initial stage for any architectural design and construction project, as this stage requires defining requirements and preparing studies for each project, including the problem and the variables in its various dimensions. 2-Analysis of the information collected. 3-Creating new ideas, after reviewing previous ideas.	53.3% agree
			Hypothesis 2 – The processes involved in the design process 1- Draw and create a plan for the initial solutions to the problem. 2- Comparing and evaluating alternatives, and then starting the project.	46.7% agree
	3-Teaching the student to apply logic for a purpose that enables him to think clearly and reach sound conclusions and inferences to avoid improper and erroneous thinking in his design work.	3- How can sound conclusions and inferences be reached in the design process?	3- Hypothesis 1 – Sound conclusions and inferences can be reached in the design work through 1. Relying on discovery in dealing with the environment surrounding the architectural designer, which helps to develop a set of distinctive designs, which suit the community and the surrounding environment, and fit the place in which the design will be applied. 2. Helping the architectural designer to develop his style of making decisions by choosing the colors, lines, and shapes of the architectural design, which are appropriate for the architectural design.	46.7% agree
			Hypothesis 2 – Sound conclusions and inferences can be reached in the design work through 1-Supporting and developing the architectural designer's ability to notice the details of the design, to achieve the final result of the design in a correct, accurate, and error-free manner. 2- Attention to cultural thought and social thought in societies; That is, the architectural design must be similar to the nature of these ideas to be readily accepted by the population. 3- Attention to show the aesthetic details of architecture, to preserve it throughout history.	Strongly agree 46.7%
engineering mechanics	Study the impact of forces on objects so that the student of architecture can learn about the analysis and composition of the forces affecting the elements of the installations, and study their balance, stability, and severity under the influence of forces.	What are the effects of force on objects? The forces affecting the elements of the installations are analyzed and synthesized, and the balance, gravity, and extent of their impact are determined under the influence of the force?	Hypothesis 1- The effect of force on objects is either concentrated or distributed, in both cases, it is either vertical or tilted at a certain angle. The slant force is calculated by analyzing it to sine and cosine and using numerical methods in the analysis.	46.7% agree / Neutral 43.3%
			Hypothesis 2 – Sometimes the member affected by the forces is drawn and then cut into small parts and the amount of each force is calculated using the laws of statics mechanics.	53.3% neutral
Human rights and democracy	1-To broaden the student's awareness of information about freedom and to learn about the history of freedoms, including men who have advocated freedom.	1-What's freedom? How have human rights been in the civilizations of ancient Iraq and other civilizations?	1- Hypothesis 1 – Freedom is that a person has the power, authority, right, and the authority to act, speak or think as he wants without any controls or limits. The civilizations of ancient Iraq and other civilizations were concerned with human rights, as the first written laws in the history of humanity appeared there on the impact of customs and traditions.	40.0% Neutral
			Hypothesis 2 – Freedom is the possibility of an individual without any reparation, condition, or external pressure to make a decision or to determine one of several existing possibilities. Law, justice, and freedom from the fundamentals of ancient Iraqi thought.	40.00% agree / 35.00% Neutral
	2-explaining to the student the democracy meaning, where the term came from, where the first democratic systems were applied, and whether or not the world and constitutions calling for democracy were applied.	2-What is democracy? Was democracy implemented in its correct and integrated form after what was called for by the world's constitutions and the Charter of the United Nations?	2- Hypothesis 1 – Democracy is a form of government in which all eligible citizens participate equally - directly or through elected representatives - in proposing, developing, and introducing laws.	33.3% neutral
			Hypothesis 2 – Democracy: is the rule of the people	neutral
Construction of	1-The student learned the basics of structural buildings and how to connect reinforced concrete columns.	1-What are the foundations of concrete buildings and how do the columns connected with them?	1- Hypothesis 1- The foundations of concrete buildings are mats and the columns are connected with them by making the longitudinal iron of the columns linked with the rebar for the base while providing an appropriate length for iron seating at an angle of 90 degrees.	44.44% agree / 40.0% agree
			Hypothesis 2 – The foundations of concrete buildings are strip, joint or single. The columns are connected with the base by making the longitudinal iron linked with the rebar for the base.	Agree
	2- Columns in concrete structural structures.	2-What is the function of columns in concrete structures, and what are their types?	2- Hypothesis 1- Reinforced concrete columns: It is one of the most important elements of structural structures and is responsible for transferring the loads from the roof and beams to the bases and from there to the soil. The dimensions of the columns depend on the loads on them and their structural design, and the dimensions of the columns decrease the higher we go. Types of columns: 1- Square columns and the column sector is square and iron is distributed in them evenly, and iron is linked using alkanes. 2- Rectangular columns and the column sector is rectangular, and iron is distributed in them on the column sector, and the iron is linked using alkanes.	53.3% agree
			Hypothesis 2- Types of columns: 1- Circular columns and the column sector is circular, and iron is distributed in them evenly on the perimeter of the column sector, and the iron is attached using Alkanes. 2- Angle columns, and the column sector shall be in the form of an angle.	46.7% agree
	3- Walls (partitions) in structural structures.	3-How to install cutouts in structural installations?	3- Hypothesis 1- The partitions are fixed in the masonry by either excavating the structure, inserting reinforcing bars extending into the masonry.	46.7% agree
			Hypothesis 2 – Or by fixing the joints between them and the concrete structure using BRC; or by using a wire rope that is fixed with nails.	Agree
	4-Doors - their types with details of their installation.	4-What are the types of doors? How are doors installed on walls?	4- Hypothesis 1 – 1- Traditional doors 2- Sliding doors. The doors are fixed on the walls by installing the frame during the construction period and after the final finishes, the door's frame is fixed with screws.	46.7% agree

Left column, top table

		Hypothesis 2- 1- folding or corrugated 2- Automatic door The doors are fixed to the walls by installing a prefabricated door with a frame after the completion of the interior finishes of the building.		40.0% agree
5-Windows - their types with the details of their installation.	5-What are the types of windows and how are they installed in the building?	5- Hypothesis 1- 1- Iron windows 2- PVC windows The windows are fixed by screws and plugs after the finishing stage.		60.0% agree
		Hypothesis 2 – 1- aluminum windows 2- wooden windows Or it is installed during the construction phase by adding arms that are connected with bricks or blocks.		53.3% agree
6- External finishes and resistance to environmental factors in ceilings (flatness).	6-What are the materials that resist environmental factors in flattening?	Hypothesis 1- Materials that resist environmental factors in flattening. Many materials are used for flattening, including flancot, tar, iso cam, polyethylene (nylon), dry dirt, sand, sticker, and sometimes Kashi mosaic.		40.0% agree
		Hypothesis 2 – Materials that resist environmental factors in flattening, Cold flancot, and the main material is cork.		46.7% agree

Right column, top table — History of Architecture II (Greek and Roman) /Architecture)

The student recognizes the most prominent qualities, characteristics, architectural and urban characteristics of Greek and Roman architecture.	What are the most prominent qualities, characteristics, architectural and urban characteristics of Greek and Roman civilization?	Hypothesis 1 – One of the most important features of Roman architecture is that the Romans used contracts in all their forms, and ancient Roman architecture was characterized by strength, low costs, and flexibility. The Roman architects did not care about building temples but were satisfied with building a special niche in each house. It is worth noting that the most important religious temples were built by Sibay and Tivoli. The Romans used the concrete used by ancient civilizations in the East to build these temples, but the Romans were able to hide the unacceptable form of concrete when they clad it with bricks and stone to take an acceptable architectural form. Greek architecture: Greek architecture depends based on its formation on the horizontal lining of the openings with stone, and then the columns are the ones that bear this weight. Since the Greeks did not understand the theory of knots and so relied on the columns and were interested in studying them, the Greeks created an art in which there is perfection and beauty, graceful proportions, and complete simplicity and this is one of the most important features of Greek architecture.	Agree 40.0% agree

Left column, bottom table

		Hypothesis 2- One of the most important features of Roman architecture is that it was complex and difficult, and this was not the case in the ancient Greek civilization, which is the cradle of Roman architecture. The main reason for the complexity of a Roman architecture is the existence of domes. Building materials and construction methods: Their buildings differed according to the purpose. Some of them were placed on a circular or octagonal shape, which are different bodies that indicate their ability in rapid construction. Greek Architecture: Greek architecture is known for its tall columns, intricate detailing, harmony, harmony, and balance. Greek Columns: The Greeks built most of their temples and government buildings in three types of styles - Doric columns are the simplest of the Greek patterns, where they had no decoration at the base, and the head had decorations, but only from the top. Doric columns are pointed so that they were wider at the bottom than they were at the top. - The Ionic columns, which were thinner than the Doric and had a base at the bottom, were decorated at the top with scrolls on each side. - Corinthian columns, the most popular of which was Corinthian decoration, were decorated with scrolls and foliage.	Agree
1-Reaching a good stage in the use of the AutoCAD program through the correlation or parallel between the two lines of acquiring the design skill and the technical skill in using the program to implement and show designs.	1-How to acquire design skills and technical skills in using AutoCAD?	1- Hypothesis 1 Through the AutoCAD program, it is possible to produce two-dimensional architectural plans as well as three-dimensional models. Through AutoCAD, various regular and irregular shapes are drawn to reach the required skill	53.3% agree 53.33% agree
computers		Hypothesis 2- Design skill and technical skill in using AutoCAD software can be acquired by contributing to the creation, modification, analysis, or improvement of engineering designs, and engineering programs are used to increase the designer's productivity and improve the quality of design.	53.3% agree

Right column, bottom table — materials resistance

1-The student of architecture recognizes the behavior of materials and construction elements as the existence of external forces and the resulting internal forces. Thus, exploiting the strengths of the material and avoiding and strengthening areas of weakness.	1-What is the resistance of materials and structural elements under the influence of external loads and forces?	1- Hypothesis 1 – Stretch resistance, compressive resistance.	53.3% agree
		Hypothesis 2 - tensile resistance - Rotation resistance.	46.7% agree

The second stage result	%42.60

The third stage	Likert scale

Educational level | study vocabulary | Ratio

Educational objectives	Possible problems	problem-solving hypotheses	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Final result Result
1-The student is introduced to complex and multifunctional projects for their various exploitative and service spaces. The construction decisions and implementation technology are at the forefront of the design proposal.	1-How are complex, multi-functional projects designed?	1- Hypothesis 1- The multifunctional project has several directions in its design, including: 1. Considering the project as a single architectural block in which several main or subsidiary entrances can be accessed to a large main interior foyer that includes a set of stairs, and from it a group of roads that reach the elements of the project. 2. Splitting the project into parts by function with a vacuum link and the possibility of providing green surfaces as open areas, taking into account the relationship of the constituent elements of the project and its formation with the surrounding environment.						48.33% agree 40.0% agree

Architectural Design III

Left column — Construction of Buildings III (Precast Buildings)

Hypothesis 2 –
1- Distribution of project elements to wings that branch off from a major distribution center.
2- Distribute the project elements freely in one large space under a roof and regularly.
3- Deviating from the norm in architectural design that adheres to functional and structural determinants.
(53.3% agree)

2-Learn the principles of designing functional requirements of a typical recurring nature, such as educational, administrative, residential, and commercial buildings, and get acquainted with some construction details directed for this purpose through a multi-story project.

2-How are structural and technological decisions employed in design projects?

2- Hypothesis 1–
The structural solutions for a particular building depend on the shape of the building, the area of the designed architectural spaces, and the loads. *(46.7% agree)*

Hypothesis 2–
Construction and technological decisions in the exterior form are employed in multi-story buildings, especially in the area of metal construction, by showing the construction is complete and is the centerpiece of design, design, or transparency in the design of facades to reflect adjacent buildings and reduce their size for the neighborhood. *(53.3% agree)*

1-The student will identify the types of foundations commonly used in precast buildings.

1-What are the types of foundations commonly used in precast buildings?

1- Hypothesis 1 –
Often the mat foundation. *(Agree)*

Hypothesis 2–
Also, the strip foundation. *(Agree)*

2-The student learns about the types of precast concrete buildings and the structural systems used in those buildings

2-What are the types of precast concrete buildings and the structural systems used in those buildings?

2- Hypothesis 1-
Types of precast concrete buildings
1-Precast Big Panel System.
2-Precast Concrete Frame System. *(40.0% agree)*

Hypothesis 2 –
It is also a type of precast concrete building Precast shear wall slab column system. *(40.0% agree)*

(40.0% agree)

3-The student learns the structural details to implement the closed and open system.

3-What is the difference between the closed system and the open system in the factory building?

3- Hypothesis 1 –
In a closed system of construction, the sources of materials used are limited to certain limits, such that they are confined only to a particular town or country, forcing us only to use them.

Hypothesis 2 –
The open system, on the contrary, the resources are available, allowing greater freedom in the diversity of the materials used. *(40.0% Neutral)*

Right column top — Cladding / Curtain walls / Facing

4-The student learns Cladding, Curtin walls, Facing, and In fills.

4-What are the methods of installing external covering materials (Cladding, Curtin walls, Facing)?

4- Hypothesis 1 –
Methods of installing external covering materials (Cladding, Curtin walls, Facing).
1- Regular installation method: Tubes of aluminum and galvanized iron measuring 4 * 2 mm or 4 * 4 mm thickness of 2 mm are installed with screws 10 mm and iron or aluminum corners 5 * 5 cm or 10 * 10 cm thickness of 5 mm. Where the joints are filled with silicone and then rubber bands.
2- Zero joint installation method. Similar to the first method, except that it does not contain spacers, as the side of the board is inserted with the board next to it, and it is fixed with screws without partitions.
-The facing panels are simple and are fixed with screws or nails with the plastic anchor fixed with glue.
-(curtain walls) its composition depends on the type of the C.wall where the unit:
1-none load-bearing system.
2-structural gloating.
3-double skin curtain. *(40.0% agree)*

Hypothesis 2 –
Methods of installing external covering materials (Cladding, Curtin walls, Facing).
1- Mechanical method: Tube Runner 10*5 is installed longitudinal and latitudinal on the facade and the sides of the board are perforated so that it is bent and installed directly on the structure.
2- Three-dimensional installation method. (Drawing method).
- The panels facing through an iron anchor and fixed with screws. *(40.0% agree)*

Left column lower — History of Architecture III (Christian and Renaissance Architecture)

1- The student learns about the most important architectural features.

1-What are the most prominent characteristics of Christian architecture and what are its structural patterns?

1- Hypothesis 1-
-At the dawn of Christianity, the horizontal elevations followed the horizontal elevations of the basilica churches. Many Roman buildings used baths, grand halls, public halls, and residences as places of worship. During that period, church bell towers and the baptismal building appeared, it is a circular building independent and connected to the church.
-Ceilings: Wooden ceilings were used to cover the nave of the church, using simple construction methods, such as the wooden truss roof with one or two pillars. The ceiling of the sides of the church was built in the manner of the vault and the dome, for the ceiling of the mihrab and covered with beautiful glass mosaics. *(53.3% agree)*

Hypothesis 2 –
- Walls: The walls were built in the same Roman way using rubble or concrete, and they were covered with stone, whitewash, or bricks. From the inside, the mosaic decoration was done, and sometimes the western wall was decorated from the outside, and the external appearance was not important to them. Apertures: The semicircular arch was used to follow the windows and doors. The arches of al-Bawaki focused directly on the capitals of the columns, and there is no patina in these halls. In some cases, the straight butt of the windows and doors was used, and the thin marble ornaments were added around the openings. *(46.7% agree)*

2- The student learns about the style of Byzantine architecture, its characteristics, and the reasons for its emergence.

2-What is the style of architectural buildings in Byzantine architecture and the reasons for their emergence?

Hypothesis 1-
-Using pendentives to hold domes on square halls.
-The site is a large square dish above the main dome, and it has four arms that form a cross, and the roof of each of these arms is in the form of a vault or half a dome, and the four corners between the nave and those arms were their roofs in the form of small domes.
- The circular openings in the domes and walls clearly distinguished this style. *(60.0% agree)*

Right column lower

Hypothesis 2-
-A feature of Byzantine architecture is that the details of internal churches were similar to those of churches in Roman civilization, and the Byzantines used mosaic decoration in floors and ceilings.
- Among the features of Byzantine architecture are the use of concrete by Byzantine builders in the construction of walls and domes, the use of light pottery in the construction of domes, and bricks by Byzantines in a small way compared to Italy. *(Agree)*

3- The student gets to know the most prominent architectural characteristics of Gothic architecture.

3- What are the characteristics and advantages of Gothic architecture?

3-Hypothesis 1-
What are the characteristics of Gothic architecture? Having a pointed arch, the Gothic window structure evolved from simple openings to rich and ornamental sculptural designs, the vault, dividing the interior space into individual cells according to the ribs and vaults of the building. *(Agree)*

Hypothesis 2-
A characteristic of Gothic church architecture is its height, absolute in proportion and its width, the verticality which indicates looking up to the sky. Most of the large Gothic churches are of Latin cross plan with a long nave that makes the body of the church, a latitudinal arm. *(46.7 agree)*

4- The student learns about the influencing factors and the architectural characteristics of Romanesque architecture in Europe.

4- What are the factors affecting Romanesque architecture in Europe and the characteristics affecting it?

4- Hypothesis 1 -
-This style is characterized by the frequent use of vaults and their use for the bishop of the church.
-Use vaults instead of wooden ceilings.
-The use of intersecting vaults located on a square area, represented by the intersection of two continuous vaults of equal circular text, resulting in an oval intersecting surface. *(53.3 agree)*

Hypothesis 2
- The use of cross ribs to facilitate construction, as it can be built on light packages.
- Using the cross vault on the rectangular spaces by raising the arches with a small arrow, so that their crowns are at the same height as the arches with a large arrow. *(46.7 agree)*

Principles of urban planning

				Agree
1-Introducing students to the principles and concepts of urban planning.	1- What are the concepts and principles of urban planning?	1- Hypothesis 1 – Urban planning is the strategy adopted by the authorities responsible within the state for making decisions, to develop and direct new urban environments and work to control their growth and expansion. Principles and foundations of urban planning 1-Take into account economic, population, and social aspects, on the one hand, and cultural and psychological aspects, on the other, as essential components of urban environment plans. 2-Dealing with the natural characteristics and geographical locations of urban areas, taking into account the locations of those areas, which play an important role in their urban growth, with some having the possibility of expansion and development, and others not.		53.3% agree
		Hypothesis 2 – -Urban planning is one of the responsibilities of the state through local authorities and governments in multiple regions, and it is a governmental function that works to integrate the activities applied by governments and the higher authority in society, to organize and configure residential buildings, universities, schools, transportation, and multiple service centers within the city. Principles and foundations of urban planning 1- Urban planning, like other types of planning, is linked to political, administrative, and financial decisions, in the light of which the powers and roles of planning bodies are defined. 2- Urban planning is a process of interconnected and at several levels/state - region - city.		46.67 agree / 40.0 agree

Computers 3d-max I

				Agree
1-identify a common program used in architectural design to build virtual models using 3D max.	1- How to build virtual models using the 3ds max program?	1- Hypothesis 1 – Polygon Modeling: Connecting points in 3D space, through segments of lines, to form a network of polygons - The vast majority of 3D models today are built as polygon models, because they are flexible and because computers can process work quickly. However, this method has a problem with curved surfaces, as it uses many polygons to form a streamlined shape. However, this method has a problem with curved surfaces, as it uses many polygons to form a streamlined shape.		46.7% agree / 50.00% agree
		Hypothesis 2 – Curve modeling: The surface is formed by curves, and these curves are affected by the location of the points. The point does not need to touch the surface. The method is called NURBS. The modeling phase means the formation of individual objects that are used later. There are several modeling techniques, including: • Solid Construction Engineering • Implicit surfaces • split surfaces		53.3% agree

Construction I (Constructive Behavior)

				Agree
1- Introducing the student to the subject of forces, analyzing them, and distributing them to the facilities, as well as knowing the reactions in the facilities.	1-What are the forces affecting the origin, methods of analysis, and distribution, and what are the reactions in the origin?	1- Hypothesis 1 – Forces affecting origin, methods of analysis, distribution, and reactions in origin. 1. The total dead load of the building or structure, which is directed downward by gravity and is offset by the reaction of the soil under the foundation and is upward. 2. 2- The live load and the traumatic load have a similar effect and direction to the dead load, except that the percentage is lower and may cause a little lateral force. 3. The impact of wind force and is pure, its value is the maximum possible from the top of the origin and it is direct. The higher the height of the structure, the greater the influence of the wind and corresponding to the maximum reaction of the soil in the opposite direction to the gust of wind.		48.33% agree / 53.3% agree

				Agree
		Hypothesis 2 – Forces affecting the origin, methods of analysis, distribution, and reactions in the origin. 1-The effect of earthquake forces and their effect is in two or more directions, and the structure of this type of force is designed to accurately absorb its effect on the structure and prevent it from falling or being damaged. 2-Soil erosion or rising groundwater levels.		40.0% agree
2-Introduce the student to the trusses, their types, and the distribution of forces on them.	2- What are the trusses and their types? How are the forces distributed over them?	2- Hypothesis 1 – Trusses, their types, and the way forces are distributed They are members of steel connected by joints and forming adjacent triangles that give trusses a specific shape. There are many types of trusses such as Pratt trusses, Finc trusses, Banquen trusses, Howe trusses.		60.0% agree
		Hypothesis 2 – Trusses, their types, and the way forces are distributed Trusses bear loads such as concentrated loads that affect the joints of the truss and cause the joints to bear tensile or compressive axial stresses without bending torque. There are many types, Warn truss, graded truss, serrated truss, and semi-flat truss.		46.7 agree
3-Introducing the student to the various internal stresses and the effects generated by the types of forces and torques on the various engineering materials	3- What are the types of internal stresses, forces, and moments generated by the effect of different engineering materials?	3- Hypothesis 1- As a result of applying external loads to the various structural elements, internal forces arise that resist these forces, the desire of external forces to destroy the structural element, change its shape and separate part of it from the other. Among these forces are tension, pressure, shear, bending, and torsion.		53.3% agree
		Hypothesis 2- These forces also include bending and tension		33.3% agree
4-Introducing the student to the concept of elongation and its effect on some structural parts.	4- What is the effect of elongation and its impact on structural parts?	4- Hypothesis 1 – Because of the different coefficients of expansion of the different internal materials in the composition of the structural elements, the elongation has a different effect. Thus, the structure is subjected to a varying effect of its elements, which causes the emergence of cracks that weaken the structure of the facility, cause deformation of the architectural form, or destruction of health services, at which point the results are catastrophic.		53.3% agree

Health services

				Agree
		Hypothesis 2- The effect of elongation on the structure causes a problem in water pipes, sanitary pipes, or electrical installations		46.7% agree
1- Introducing the architectural student to the basic principles of designing health services.	1- What are the basic principles for designing health services for buildings?	1- Hypothesis 1- 1. Determining the amount of daily sewage per capita, for example, 225 liters per day. 2. Determining the peak coefficient i.e. the ratio of maximum discharge to average discharge.		53.3% agree / 50.00% agree
		Hypothesis 2- 1. The diameters of the pipes to be used for public sewage lines must be specified. 2. The ratio of the depth of flow in the pipes must be determined and the highest standard for the flow of pipes for all diameters should be adopted.		46.7% agree

Air conditioning services

				Agree
1-Introduce the student to how to calculate the heat loads required for each building and how to choose the air conditioning system necessary to provide the necessary heat load and overcome it to provide comfort conditions inside the space	1-How do you calculate the building's thermal loads? And how to select the air-conditioning system needed to provide the heat load needed to provide thermal comfort conditions.	1- Hypothesis 1 – The thermal loads of the building are calculated? How is the air conditioning system needed to provide the necessary heat load to provide the conditions for thermal comfort? This is done after calculating the impact of several factors on the building, and each factor has special equations to accurately calculate, and these factors include: 1. Factors affecting heat gain 2. heat gain 3. Heat transmitted through the building 4. The heat from the sun 5. Lighting temperature		53.3% agree
		Hypothesis 2 – This is done after calculating the impact of several factors on the building, and each factor has special equations to accurately calculate, and these factors include: 1. Equipment and motors temperature. 2. Heat acquired by people. 3. Ventilation temperature. 4. Heat as a result of air leakage. 5. Heat is acquired through the airways. 6. Heat transfer through the side surfaces. 7. The heat is generated by operations. 8. The size of the central unit.		45.00% agree / 40.0% agree

Construction of buildings IV (steel structures)

			Rating
2-How to determine the appropriate location for this system so that it does not affect or conflict with the engineering drawing of the building.	2-How does the proper location of the air conditioning system be determined in a way that does not conflict with the building's partitions?	Hypothesis 1- 1. Studying the drawings of the building and choosing the best place to put the air handling unit so that the length of the tracks is as short as possible. 2. Calculating the quantities of air that must be supplied to each room and deducing this from the heating and cooling loads.	40.0% agree
		Hypothesis 2- 1. Selection of the appropriate pathway: peripheral or external. 2. Determining the number of air outlets per space and select their location to provide the required amount of air and its optimal distribution.	53.3% agree
1- Identifying the steel structure buildings and their characteristics, advantages, and disadvantages.	1- What are the characteristics, advantages, and disadvantages of steel buildings?	Hypothesis 1 – One of the positive properties of steel buildings is that they are economical compared to concrete, with wide spaces, and are characterized by their resistance to earthquakes. As for the negative ones, it needs a fire extinguishing system at all times, its height is limited, and its thermal insulation is weak.	53.3% agree
		Hypothesis 2 – One of the positive characteristics of steel buildings is that they are quick to achieve and light in weight compared to concrete As for the negative, it has poor thermal insulation.	46.7% agree
2- Identifying the types of basic structural steel structures and their basic structural sections and methods of strengthening the structures against different stresses.	2-What are the types of basic steel structures and building blocks? Ways to strengthen against stress?	2- Hypothesis 1- One of the types of steel structures are trusses or gables. One of the ways to strengthen it against stress is to increase the dimensions of the section or its thickness, or both, to strengthen it with another material such as concrete.	33.3% agree / 43.33% agree
		Hypothesis 2 – One of the types of steel structures is structures linked with steel wires. Also, one of the ways to strengthen it against stress is to strengthen it with another material such as concrete.	66.7% agree
3-Does the student recognize the types of steel sections?	3-What are the types of steel sections?	3- Hypothesis 1 – one of the steel sections, section H, L,	40.0% agree
		Hypothesis 2- Channel and I section	Agree

History of Architecture IV (Post-Renaissance Architecture)

			Rating
4-The student recognizes the types and methods of connecting steel construction elements and the characteristics of each method of connecting.	4-What are the types and methods of connecting steel construction elements and the characteristics of each method of connecting?	4- Hypothesis 1- Methods of joining steel elements -Screw fixing and each has its specification, sizes, and instructions.	neutral 33.3%
		Hypothesis 2- Welding method where each member is connected to the other by welding.	53.3% agree
5- Identify ways to protect steel elements from external conditions.	5-What are the ways to protect steel elements from external conditions?	5- Hypothesis 1- One way to protect steel buildings from external damage is to paint them with insulation materials such as dyes and others or to wrap them with other materials such as cork, wood, and concrete.	46.7% agree
		Hypothesis 2- Using cathodic protection, which is a modern and good method.	40.0% agree
1-identifying Rococo and Baroque architecture and its most prominent characteristics.	1- What are the architectural characteristics of rococo and baroque architecture?	Hypothesis 1 – One of the architectural characteristics of Baroque architecture - Filled with a lot of surprising details, it is huge and gives an illusion of wide spaces. - Complexity is one of its most important characteristics, as it derives its fertility from this complexity, as it combines in its style between unreality and grandeur, and is full of forms transmitted in space and colors. Architectural characteristics of rococo architecture - Lots of asymmetrical curves and C-shaped spirals. - The large use of flowers in decorations, as an example: Oaks made of flowers.	50.00% agree / 60.0% agree

Principles of urban design

			Rating
		Hypothesis 2 – Architectural characteristics of Baroque architecture - Has a very close relationship with the surrounding environment, which he actively transforms into one of the manifestations of sanctification. - It shows movement and vitality to a great extent, as it rages and irritates emotions, and in this way contradicts classical art, which generally simulates the beauty of the material world in images that represent reality in great coordination. Architectural characteristics of rococo architecture. - Chinese and Japanese decorative drawings. - Warm pastel colors (white, yellow, cream, pearl grey).	40.0% agree
2-General characteristics and features according to the period of the eighteenth and nineteenth century's architecture.	2-What are the architectural features and characteristics of architecture in the period of the 18th and 19th centuries?	Hypothesis 1 – - Using glass and iron in buildings. - It was characterized by the great size and simplicity of the geometric forms and the Greek (especially Doric) geometric shapes and orders.	60.0% agree
		Hypothesis 2- They are distinguished by the dramatic use of columns, Roman detailing, and a preference for white walls.	40.0% agree
1-Introducing the student to the basic principles of urban design.	1-What are the basic principles of urban design?	1- Hypothesis 1 – Principles of urban design -Accessibility provides a safe and easy way of moving among areas. -Civil society, providing spaces for people where they can meet freely with each other as equal citizens, is an important component in building a social city.	66.7% agree / 60.00% agree
		Hypothesis 2 – -Urban design is the link between city planning and architectural design. -There must be public spaces for the city to have a life and attention must be paid to the streets and the meadows.	53.0% agree

Computer 3d-max II / Construction II (Structural Design)

			Rating
2- Recognize how to show default models using 3ds max.	2- How 3D models are shown in 3ds max	Hypothesis 1- Through the list of standard primitive—>object types, any model is formed from the existing geometric shapes.	53.3% agree / 56.67% agree
		Hypothesis 2- From the great menu that appears on the program screen, we choose the geometry menu that shows us three-dimensional shapes great —> geometry ———> 3d shapesha	60.0% agree
1-The student learned the design of concrete ceilings with moving loads in one direction and the design of concrete ceilings with moving loads in two directions.	1-How to design concrete ceilings with loads transmitted in one direction and two directions?	1- Hypothesis 1- One-way roofs are designed after calculating the loads on the roof, then extracts the amount of iron, the short direction is spread and thus is the main armament, and its distances are close together, while the iron is spread in the long direction at greater distances because it is not major.	
		Hypothesis 2- Two-way ceilings have their main armament in two directions and at equal distances. There are different design methods based on global codes, including American, British, and others.	46.7% agree
2-The student learned to analyze and design thresholds for flexion.	2-How to analyze and design thresholds for flexion.	2- Hypothesis 1 – Reinforced concrete beams are analyzed and designed in two ways, the first is called the operating stresses method, and the second is the resistance method. In the first method, it is assumed that the proportion between the stresses and strains of concrete and iron is linear, and the use of this method diminished until it was included in the appendix in the code and was called the alternative method.	46.67% agree
		Hypothesis 2- In the second method (resistance method), structural organs are designed and analyzed based on maximum loads that the structure bears upon failure, besides, we obtain the maximum loads by multiplying the expected loads over the life of the structure by factors called safety factors.	53.3% agree
3-The student learned to analyze and design the thresholds for shear.	3-How is shear thresholds analyzed and designed?	3- Hypothesis 1 – This is done through several stages, the first of which is to find the minimum shear reinforcement, then determine the area for reinforcing the shear forces, and thirdly design the shear iron.	60 % agree

Top-left table

study vocabulary	Possible problems	problem-solving hypotheses		Result
		Hypothesis 2 – In the analysis, the dimensions of the thresholds are recognized as well as the rebar, but the amount of the applied forces is unknown. The magnitude of the greatest shear forces that the section can bear is calculated by this analysis process.		46.7% agree
4-The student learned to design continuous thresholds.	4- How are continuous thresholds designed?	4- Hypothesis 1 – The continuous threshold is based on more than two documents and its design is as follows: 1- Checking the threshold depth according to the deviation requirements. 2- Calculation of the loads applied to the threshold. 3- Threshold analysis.		26.7% agree
		Hypothesis 2- The continuous threshold is based on more than two documents and its design is as follows: 1- skew design 2- Shear design 3- The design		46.7% agree
5-the impact of elongation on structural parts.	5-What's the effect of elongation on structural parts?	5- Hypothesis 1- The impact of elongation on structural parts Due to the different coefficients of expansion of the different internal materials in the composition of the structural elements, the elongation has a different effect. Thus, the structure is subjected to a varying effect of its elements, which causes the appearance of cracks that weaken the structure of the facility or cause deformation of the architectural form. Therefore, it affects the parts of the building, then the results will be disastrous.		40% agree
		Hypothesis 2 – The impact of elongation leads to the destruction of sanitary installations, pipes, or electrical installations, and at that time the results are disastrous.		40% agree

Top-right table (Area / Educational)

				Result
1-Measuring horizontal and vertical distances and angles and beams and projecting them	1-How are distances, horizontal and vertical angles, and beams measured and projected using surveying devices?	1- Hypothesis 1 – Measure distances, horizontal and vertical angles, and beams, and project them using surveying devices. -The few straight distances are measured using the iron gauge bar. The long distances are measured either by the total station device or by the satellite system.		53.3% agree
		Hypothesis 2 – Measure distances, horizontal and vertical angles, and beams, and project them using surveying devices. The horizontal angle is also measured by a (total station) or theodolite device or, if there are beams, the device is moved to another point, the angle of deviation is calculated and the desired angle is measured.		53.3% agree
2-Measuring and determining the levels and elevations of buildings and land uses.	How to measure and determine the levels and determine the heights of buildings and land uses?	2- Hypothesis 1- Measuring and determining the levels and determining the heights of buildings and land uses. This is done using the leveling device.		46.7% agree
		Hypothesis 2- Measuring and determining the levels and determining the heights of buildings and land uses. This is done using the full station or using the satellite		53.3% agree
3-Longitudinal and latitudinal sections, volumes, and areas of regular and irregular shapes.	3-How are the longitudinal and latitudinal sections, volumes, and areas of regular and irregular shapes calculated?	3- Hypothesis 1 – Calculation of longitudinal and latitudinal sections, volumes, and areas of regular and irregular shapes. All this is done using the laws of survey engineering and practically by surveying devices		46.7% agree
		Hypothesis 2 – Calculation of longitudinal and latitudinal sections, volumes, and areas of regular and irregular shapes. Irregular shapes can be calculated by mathematical integration.		80.0% agree
Stage three result				**46.57% agree**
The four-stage			Likert scale	Ratio

(Row label left margin: 55.56% agree; Area; Educational)

Bottom-left table (Architectural Design)

study vocabulary	Educational objectives	Possible problems	problem-solving hypotheses	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Final result
Architectural Design	1-Intellectual and practical recognition of urban design principles.	1-What are the principles of urban design intellectually, and how are they applied in practice?	1- Hypothesis 1- - Accessibility Provide a safe and easy way to move between spaces and areas. Creating a comfortable environment that includes pedestrian and bicycle streets, and scale human buildings to create a strong sense of place. - Civil society, providing spaces for people where they can meet freely with each other as equal citizens, forming an important element in building a social city.						60.0% agree
			Hypothesis 2 – - Providing a mix of housing patterns and housing densities for all groups, and securing housing near the streets to encourage social interaction. - Securing a high density of housing to reduce land consumption to provide spaces between areas to enable efficient use of services and resources and to provide commercial services while ensuring easy access. - Intelligent transport: the hierarchy of roads, public transport network, and environmentally friendly street design to encourage bicycle use and walking as daily short-distance transport						53.33% / 60.0% agree
	2-guide the student to the methods of connecting to the city's general fabric and the extension of the visual and kinetic axes in it and its impact on the formulation of the fabric of the specific environment to be	2-What are the ways to connect to the city's general fabric and the extensions of visual and kinetic axes?	2- Hypothesis 1 – Urban development: In urban development, the city's general fabric must be connected to the extensions of the visual and motor axes where the connection is made through the set of actions to ensure physical continuity so that we do not notice any intersection between the old urban fabric and the formally updated physical fabric by Functional integration of forces affecting the urban environment (social, environmental and economic).						53.3 agree

Bottom-right table (Interior spaces Design)

			Result
	designed within the specifications, standards, and contemporary visions and in line with the controls and limitations in force in the city's municipality.	Hypothesis 2- or link via Site integration is related to the contextual characteristics that the urban fabric carries.	40.0% agree
1-Introduce students to the great role of interior spaces on the user, as a modern man spends most of his time indoors.	1-What is the role of the internal spaces on the user?	1- Hypothesis 1 – Providing comfort and entertainment.	40.0% agree
		Hypothesis 2 – Function and beauty.	60.0% agree
2- Enabling students to understand the foundations of interior designs and how to deal with design problems	2-What are the foundations of interior spaces designs and how are the design problems of interior spaces dealt with in terms of functional, aesthetic, symbolic, and service aspects?	2- Hypothesis 1- 1- Choose the colors. Colors are an important element in the life and activity of the place, and each color has its connotations and psychological effect. Thus, before start choosing the colors of the walls or furniture, the patterns for choosing colors are. 2- Lighting. Lighting in space is one of the most important elements and fundamentals of internal decoration. There are three types of industrial lighting; Guided lighting, important lighting, and mood lighting.	53.33 agree
		Hypothesis 2 – Unit Unity is another point of the basics of interior decoration and does not necessarily mean the symmetry or consistency of furniture or engravings and paintings in the same place, however, the general view must suggest continuity and there must be common points where the eye moves from one place to another, such as painting walls in one color, or the floors are the same type of ore used in furniture in all rooms.	80.0% agree

(Left margin label: interior spaces Design)

Housing — 1-Introducing the student to the principles and different patterns of housing in general, such as single-family housing, multi-family housing, and the planning and design variables affecting each.	1-What are the housing principles and patterns and the design and planning variables affecting these patterns?	1- Hypothesis 1 – Housing principles • Compact fabric and population density • Providing gardens and public spaces. Housing patterns -At the unit level (separate room, apartment). -At the residential building level (independent unit, combined unit).	75.3% agree
		Hypothesis 2 – Housing principles • Diversity of means of transportation. • Diversity of land uses. Housing patterns At the level of the housing group (semi-attached dwellings, class dwellings, quadruple dwellings).	60.00% agree
2-The student recognizes some of the housing criteria and determinants associated with the final design decisions of the residential building, such as vertical mobility, immediate evacuation, fire determinants, and some of the characteristics of housing in hot, dry areas.	2-What are the housing standards and determinants associated with the final design decisions of the residential building?	2- Hypothesis 1- Vertical movement limiters, immediate evacuation, and fire Determinants.	53.3% agree
		Hypothesis 2- The determinants of environmental housing, especially in hot, dry areas. It's like using building materials that suck up the heat during the day and lose it at night, besides, reducing the areas of external facades exposed to external heat.	53.3% agree
Architecture Theory 1 (Architecture of — 1-Introduction of the student to the dimensions of modernist architecture according to the basic terms that build the architectural text such as functionality, durability, and beauty.	1-What is modern architecture and has modernity architecture achieved (functionality, durability, and beauty)?	1- Hypothesis 1 – Modernist architecture is an architectural period with a trend that includes a group of schools and architectural styles that have similar characteristics, and that share primarily the simplification of forms and the rejection of ornamentation. The beauty of things is the result of the compatibility of parts of something according to certain relationships between parts, considered in certain proportions (such as ratio and proportionality in the human body). Beauty should link beauty and architecture, not an external description.	55.00% agree / 53.3% agree

	Hypothesis 2 – The architecture of modernity expressed the benefit and clarified the material society's need for buildings that achieve utilitarian functional content. As for durability, it emerged in the new technology through the use of concrete and steel structures, which illustrate the beauty of the complementarity of the form with the practical functional requirements. As for the suitability, it oscillated in the modernist architecture between the fulfillments of the material need of the community with the structural-functional integration of the building.	60.0% agree
2-The student recognizes technological and scientific developments in modernist architecture. / 2-How have technological and scientific developments affected modernist architecture?	2- Hypothesis 1 – Modern building materials and construction methods have influenced an evolution in the form of the architectural space, which includes the most important elements: walls, ceilings, and the ground, where new forms of flexibility and multiple variations in the shape of the vacuum have emerged. This is reflected in the different and multiplicity of construction methods and building materials, so different structural systems appeared, such as the structural system, trusses, space structures, stretched structural membranes, and blown structural membranes. The impact of the construction method on the architectural form is evident.	46.7% agree
	Hypothesis 2 – The influence of technology on architecture has led mainly to the creation of different architectural models. As the methods, materials, and properties of materials have evolved, building forms have changed from prehistoric architecture to the present day.	60.0 agree
Architecture and climate — 1-Introducing the student to a broad information base of the entire basic concepts of the interrelationship between the natural environment and architecture at the regional level in general and the local level for the regions of Iraq in particular / 1-What does the natural environment have to do with architecture and how do natural factors affect architecture at the regional level in general and the local level of Iraq in particular?	1- Hypothesis 1 – Definition of architecture: Architecture is defined as the art of construction, and this art varies from country to country: European architecture, Asian architecture, city to city in the same country, rural buildings are different from urban buildings. The relationship between architecture and the environment. environmental architecture: The relationship is with the so-called construction technique, which is all of the building-related applications by dealing with the following diverse environmental elements: - Climate (above ground temperature, underground temperature) - energy	56.67 agree / 46.7% agree

	Hypothesis 2- Natural factors affect architecture by gaining heat from the Sun, where it is done by several factors: 1- Earth's morphology: Leaning Earth facing the Sun gains more energy than leaning Earth in the opposite direction. 2- Orientation of buildings: The orientation is that the largest facade of the building is towards one of the four cardinal directions, if the largest facade of the buildings is directed towards the sunrise, there is no doubt that it acquires its morning heat until the sun turns to the west in the second half of the day, and the western facade acquires the heat of the sun in that period. 3- Mass formation of buildings: The cube of a single building gains ambient heat through five faces, but if a set of eight cubes theoretically converges, the surfaces prone to thermal acquisition number up to twenty. Accordingly, the closeness of the buildings or their proximity to each other so that one shades the other helps reduce heat gain. 4- Design: It is represented in the design's ability to provide a courtyard (space area) in the middle of the building because this courtyard works to store cold air at night to be used during the day.	53.3% agree
2-The student's recognition of climate negatives and positives and the method of protection to reach planning and design values may be the basis for determining the local climate level of architecture and the local climate in the interior spaces. / 2-What are the methods of protection and access to internal spaces that take into account human physiological requirements?	2- Hypothesis 1- 1-Choosing the appropriate lighting, as lighting is considered one of the basic elements in interior design and one of the most important configuration data in architectural space. 2-Colors: Color plays an important role in giving vitality to surfaces.	73.3% agree
	Hypothesis 2 – Floors are an important element of interior architecture that must be well chosen in concert with the colors of walls.	53.3% agree

3-Determining the basic processing lines in residential and public buildings so that the student can adopt them in his design work, whether at the academic level or the application level. / 3-What are the basic treatments in residential and public buildings that are adopted in designs to reach spaces where environmental aspects are taken into account?	3- Hypothesis 1 – The basic treatments in residential and public buildings that are adopted in the designs to reach spaces that take into account the environmental aspects. Methods of protection and access to internal spaces take into account the physiological requirements of the human being. There are some things that we can control to reach comfortable inner spaces for humans - Environmental Controls. - The physiological comfort system (thermal comfort). - Humidity.	66.7% agree
	Hypothesis 2 – Protection methods for access to internal spaces that take into account human physiological requirements include elements of environmental control - Solar radiation. - Air movement (ventilation)	46.7% agree
Building Technology — Introducing students to technology (in general) as thought, application, and structural technology in particular, and the stages of technology development from primitive and craftsmanship to modern scientific/industrial, and its relationship to / How has technology affected architecture in terms of design, implementation, and performance (specifically the modernist and postmodern periods)?	Hypothesis 1 – At the design level, evolution has led to the emergence of computers through which all building plans are completed before implementation. In terms of implementation and performance, the industrial revolution helped increase energy and the development of building technology and materials, leading to rapid implementation of cities and the extension of architecture (the use of steel, iron, and reinforced cement increased the spaces between columns and the establishment of multi-story buildings), and new industries and scientific innovations became productive for the building field.	70.00% agree / 73.3% agree

architecture at the design, executive, and performance levels.		Hypothesis 2 – implementation and performance level Evolution in building materials. Technology allows for the improvement of the performance of some old materials, such as reinforced cement, wood, or iron, except for some obvious developments. - The emergence of many manufacturing materials such as plastics with different compositions and their flexibility in processing, casting, and coloring. - Development of glass materials to show modern types of heat treatment, sound insulation, and self-cleaning types. Another smart type, Glass Smart, can control transparency and opacity by connecting to a small current.	66.7% agree
Architecture and Society — By defining the relationship of architecture with society and the levels and mechanisms for achieving it.	What is the vocabulary of the relationship of architecture to society and its levels and mechanisms for achieving it?	Hypothesis 1 – The nature of architecture, which differs from one person to another, is not only affected by humans, but also affects their psychological state, nature, and behavior, and even affects their physiological state. The impact of architecture on humans, especially urban residents, as the design of buildings in cities sometimes causes stress and anxiety for residents and increases stress. Mechanisms to verify the relationship through - Participation in the design. - Architecture must reveal its content, accurately. - Standards for use and live experience.	53.33% agree / 53.33% agree

		Hypothesis 2 – Architecture has a great impact on society and enables architects to build buildings that are more suitable for residents, more comfortable, and more attractive. For example, that the windows in the place be large and easy to open to allow natural daylight to enter the house, which raises the level of melatonin in the body, which regulates the biological clock, increases sleep efficiency, and increases the secretion of serotonin, it is the hormone that emits a sense of happiness, and the innovative and artistic design is also something to be loved unless of course, it affects the integrity of the building. It suggests having spacious, well-ventilated, and lightly lit places of rest amid technology crowds in public places and also improves the psychological state. No one disagrees with the impact of architecture on nature and the culture of society. Ancient architecture differs from Greek architecture, which differs from African architecture, for example, because culture and heritage differ from one society to another. The nature of the climate also varies, for example, sloping roofs spread in cold lands where snowfalls, and different resources and the nature of the land affect the nature of buildings. The resources and nature of the land that affect the nature of the buildings vary. We should also not differ on the impact of architecture on society, as the effects are noticeable and significant.	Agree

Exterior Spaces Design — 1-Introducing the student to the basic principles of designing the outdoor space or what can be called the garden landscape and activating its integration with a single building or with a group of buildings within the general urban landscape.	1-What are the basic principles for designing outer space and activating its integration with a single building or with a group of buildings?	1- Hypothesis 1 Basic principles of outer space design 1- Simplicity: Simplicity is the modern trend in planning and landscaping gardens, as gardens are crowded with plants, facilities, or many buildings due to confusion and lack of harmony in the general form of design. 2- Unity: It is one of the most important elements in the layout that shows the garden coherently. It is also a unit of the final image of the garden and the interdependence of its various elements, their compatibility, and compatibility, in addition to the compatibility between the garden for all its aspects, the neighborhoods, the buildings, and the surroundings. 3- Color Prev alert: It means the predominance of a certain color or more for most of the features of the garden over them, as it is consistent with the place where the garden originates, and this does not preclude the use of other colors that complement it, but to a small degree and not focused. 4- Design Axial: Each garden has its axes, which are imaginary lines, including the main longitudinal axis and one or more secondary or latitudinal axis perpendicular to the main.	50.0% agree / 60.0% agree

		Hypothesis 2 – 1- Sequence: The sequence is one of the important foundations in designing and landscaping gardens. The arrangement and the follower are in the line of sight of the scene (perspective), so the eye looks and moves on the elements and components that are the dominant of the scene first and then to the less dominant elements. 2- Emphasis: It is necessary to have a certain point to avoid looking more than the rest of the sites, for example placing a pond or a small geometric water basin and in the middle of it a prominent monument or statue. 3- Enlargement or Extension: Expansion is a deception of sight. It is known to most people that a person often feels comfortable when he is more spacious since nature has scenes that extend to long distances and seem unlimited, for example, when placing huge furniture or making wide walkways in a limited-dimensional garden space, it appears smaller than reality.	53.3% agree
2-Guiding the student to know how to address site problems optimally and to invest its characteristics and components to serve the integrated visual scene between mass and space.	2-How to address site problems and invest site characteristics and components to serve the integrated visual landscape between mass and space through external design?	2- Hypothesis 1 – Site problems are addressed and site properties are invested through - Space of Identification: This can be done by distributing coordination elements to distinguish areas, paths, or uses to make it easier for residents or arrivals to identify them. - Treatment Environmental: These elements are used to reduce the damages of the harsh climate by spreading shade, reducing the temperature, or reducing dust.	40.0% agree
		Hypothesis 2 – Or by addressing some natural problems. Treatment Natural: This is done through the use of trees to stabilize the sandy soil moving.	46.7% agree

Left table

Islamic architecture

Objective	Question	Hypotheses	Result
1-Introducing the student to the features and advantages of Islamic architecture through exposure to that product in its various types of functions (mosque, dwelling …. etc.)	What are the features and advantages of Islamic architecture?	1- Hypothesis 1 – Features and advantages of Islamic architecture 1- Features and advantages of Islamic architecture. 2- The architecture of the mosque is distinguished by the presence of the courtyard. The covered courtyard is distinguished by leaves surrounding it to protect the worshipers from the heat of the sun. 3- The muezzins are distinguished by a special design and interest in Islamic architecture and art.	46.7% agree
		Hypothesis 2 – The Islamic architecture was also distinguished for the architecture of the dwelling: 1. It was distinguished by the construction of isolated units and buildings dedicated to women (harems). 2. They were distinguished by balconies overlooking the main road, with small narrow openings protected by iron bars. The upper balconies were wide and appropriate, covered with wooden mashrabiyas to protect them from the sun. 3. Entrances and Slots: Entrances are characterized by deep rectangular slots horizontally, the depth of which is half their width.	43.33% agree / 40.0% agree

Architecture Theory II (Postmodern Architecture)

Objective	Question	Hypotheses	Result
1-dealing with the theoretical shifts in postmodern architecture through Robert Venturi's argument of complexity and contradiction.	1-What are the theoretical shifts in postmodern architecture according to Robert Venturi's "Complexity and Contradiction"?	1- Hypothesis 1 – Instead of functional theories of modernity, Venturi suggested giving primary focus to the facade, including historical elements, subtle use of unusual materials and historical allusions, and using fragmentation and modulation to make the building interesting.	53.3% agree
		Hypothesis 2 – Postmodern architecture emerged in the 1960s as a reaction to perceived shortcomings in modern architecture, particularly its rigid tenets, its unification, its lack of adornment, its habit of ignoring the history and culture of the cities in which it appeared.	70.00% agree / 86.7% agree

engineering services

Objective	Question	Hypotheses	Result
The topic aims to introduce students to engineering services that accompany the construction schemes used in buildings by reviewing these services, how they are implemented, how they are applied in buildings, and by identifying the details adopted for each.	What engineering services accompany the construction schemes in the buildings and their implementation methods?	Hypothesis 1- To implement the facility accurately and without errors, the architectural, electrical, sanitary and other plans must accompany the construction plans to ensure that these plans do not conflict with each other and that each paragraph is implemented correctly.	53.3% agree
		Hypothesis 2 – To implement the facility accurately without errors, the plans for air conditioning, refrigeration, fire systems, and others must accompany the construction plans.	25.0% agree / 46.7% agree

sustainable architecture

Objective	Question	Hypotheses	Result
Introduce students to the concept of sustainability in general and sustainable architecture in particular, providing a broad and somewhat comprehensive information base.	What is sustainable architecture and how is sustainability related to the design aspect?	Hypothesis 1 – Sustainable architecture or green architecture is a general term that describes environmentally conscious design techniques in the field of architecture. It is the process of designing buildings in a manner that respects the environment, taking into account reducing the consumption of energy, materials, and resources, while reducing the effects of construction and use on the environment, while regulating harmony with nature. Environmentally sustainable design is the philosophy of designing physical objects, the built environment, and services to comply with principles of environmental sustainability.	66.7% agree
		Hypothesis 2- Sustainability is the development that meets the necessities of the present without compromising the ability of future generations to meet their needs. Since architecture and urbanism reflect the reality of growth and development in society, the concepts of sustainability needed to permeate the architectural and urban work so that sustainable understanding became a basic trend that cannot be overlooked in any building or organizational scheme	60.00% agree / 53.3% agree

		Fourth stage result	**Agree %56.19**
Educational level		**The fifth stage**	**Likert scale**
			Ratio

Right table

Architecture Audios

Objective	Question	Hypotheses	Result
1- Capable of designing acoustically efficient auditoriums.	1-How can acoustically efficient auditoriums be designed?	1- Hypothesis 1 – To reach the design of acoustically efficient auditoriums: 1- When constructing a hall, it is necessary to stay away from the regular shape, because the spread of sound in the irregular shape will be better to prevent the strengthening of the sound at certain frequencies without the other frequencies, which makes the sound appear distorted. 2- The inclination of the walls and the non-orthogonal corners should be taken advantage of to keep the returning waves away and reduce the resonant frequencies. 3- Using packaging materials that are good for sound absorption, as well as using surfaces that have a great ability to scatter and weaken waves.	46.7% agree
		Hypothesis 2 – We need to move away from circular and oval shapes where their problems are: 1- Creating an audio focus inside the hall. 2- 2- Sound rotation around the walls of the round hall. Acoustic hotbeds result in no homogeneous distribution of sound and sound sources heard during the original sound.	46.7% agree / 60.0% agree
2- Able to adapt the interior design vocabulary of audio spaces to raise the efficiency of audio performance.	2-How can the efficiency of audio performance be raised by adapting the vocabulary of interior design?	2- Hypothesis 1 – walls: The back walls of the halls should be made straight and not concave. The walls of the hall are perfectly designed, packed with sound-insulating material, and filled with dispersive or sound-absorbing material.	53.3% agree
		Hypothesis 2 – Hall chairs: The distance between a chair and the back of another chair should be from 86 cm to 144 cm, where the last distance is suitable for the person so that he does not stand. To pass someone else in the same room seat class. The width of the corridors at the level of the hall should be 3 m and at the other levels, the width is 1.5 m. If the hall area is more than 350 square meters, then the width of the corridors must be increased by 15 cm for every 50 square meters.	60.0% agree

study vocabulary	Educational objectives	Possible problems	problem-solving hypotheses	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Result	Final result
Architectural Design V	1-Focusing on the concept of urban development through direct field documentation of heritage areas or central areas in cities.	1-1- How is the urban development of heritage areas and central areas of cities?	Hypothesis 1 – Urban development is done by studying the reality of the situation in the area concerned and through plans that show the land uses, the construction situation, the heritage condition, and the diagnosis of the preservation buildings. In light of this, the planning alternative and the appropriate urban design for the development of the region are presented. These alternatives 1. Developing folk and heritage markets attractively and beautifully, aesthetically and functionally, and preserving them from extinction. 2. 2- Old buildings should not be used as commercial markets and can be used as restaurants, attractions, and tourist areas. 3. Not to give licenses for new high-rise buildings in the area. If licenses are given, the external facades must be appropriate and consistent with the existing facades. 4. Laying down laws to standardize the design frameworks for umbrellas and billboards, and standardizing the colors of doors for shops.						43.33% agree / 40.0% agree	

Hypothesis 2 –
1. Work to provide the necessary funding to preserve, restore, rehabilitate and use heritage buildings.
2. Providing sufficient funding for the cadres working in the area to be developed on how to deal with and preserve heritage areas.
3. Laying down laws and regulations related to the protection of historical and archaeological areas in general.
4. Issuing laws plans and designs to develop the aesthetic and visual appearance of the area to be developed. Recommendations for the concerned institutions, including the Ministry of Tourism and Antiquities, municipalities, institutions, and heritage associations.
5. Reviving traditional crafts in local architecture and rehabilitating specialized staff.

46.7% agree

architectural trends of Arab architecture, focusing on the most important conceptual and practical transformations during the different decades of the stage. / **Arab architecture has undergone during the different decades of this stage?** / **Hypothesis 2-** 1- Transformation of Architectural Identity. 2- Social and cultural transformations. — *66.7% agree*

2-identifying the most important civilizational and cultural influences that accompanied these transformations and their impact on contemporary Arab architectural practice / **2- What are the most important civilizational and cultural influences on contemporary Arab architectural practice to produce architecture that belongs to the place?** / **3- Hypothesis 1-** The city and the urban fabric are the products of culture. — *46.7% agree*
Hypothesis 2- Social customs and traditions have greatly impacted the thought and practice of architecture. — *80.0% agree*

supposition

1-The A student's recognition of how to promote the sense of belonging and connection to the deep roots of his country. / **1-Promoting the place belonging to the deep roots of the country** / **1- Hypothesis 1 –** Promoting place belonging as well as country's deep roots by dealing with the heritage vocabulary by subjecting the vocabulary to certain mechanisms based on the character of the architect and the way he understands and treats the vocabulary. — *46.7% agree* / *43.33% agree*
Hypothesis 2- By quoting elements and symbols of heritage. — *40.0% agree*

Architecture Philosophy

1-The student's recognition of the nature of philosophical knowledge and the general grounds for reflection. / **1- What is philosophical knowledge? What are the general foundations of philosophical thinking?** / **1- Hypothesis 1-** Epistemology is the study of the nature of knowledge, explanation, justification, and the rationality of belief. General foundations of philosophical thinking:
1- There's ground for critical thinking: And that means thinking about things in the sense that it's not the obvious premise that takes things the way they are.
2- Doubt and denial: This means placing ideas on the scale of logic and weighing whether or not they are close to logic. — *53.3% agree* / *48.3% agree*

Hypothesis 2 – Knowledge of things, subjects, and how to do things. At this point, knowledge was considered something that existed and the human mind had only to reflect on it as it was. Philosophical knowledge was used for some scientific uses and received no mental analysis. Only in Greece, whose civilization had developed the concept of theoretical knowledge that they had acquired and were able to codify. The general basis for philosophical thinking. College and abstraction: These characteristics mean not looking at things, but looking at what they are and not only imagining things as material but also studying non-sensed phenomena. — *60.0% agree*

Contemporary Arab

1-From the early twentieth century to the present era, the course deals with the different / **1-1- What are the most important conceptual and applied transformations that** / **1- Hypothesis 1-** 1- Socio-economic-political-technical transformations. 2- Mental transformation. — *63.33% agree* / *60.0% agree*

2-understanding the philosophical position in contemporary architecture. / **2- What is the philosophical position in contemporary architecture?** / **2- Hypothesis 1-** Architecture, like the rest of the arts, has constants and variables, and one of its variables is philosophy, which relies on the sense, thought, culture, and environment of the architect to bring out a creative idea that suggests the character and function of the builder convey a message and meaning to the viewer and be one of the civilizational landmarks of this time and reflect the civilization of the nation. — *46.7% agree*

Hypothesis 2 – At the beginning of a particular project, we start with an idea, and since the architectural idea is the beginning and the most important thing in the project, here appears the role of philosophy and the many questions that in turn lead to the emergence and crystallization of the idea of design as it's a sense, and a sense of inner space leads to a good distribution of building elements and good exploitation of space, and what the building works with is an external vacuum that leads to an architectural creation that symbolizes and signifies the realism of the building's architecture. — *33.3% agree*

2-identify the general and special conditions of construction contracting. / **2-What are the general and special conditions for construction contracts?** / **2- Hypothesis 1 –** General and special conditions for construction contracting
1- Name of the tender.
2- 2- Submitting bids.
3- Documents attached to the bid: The bidder must attach with his bid the following documents:
a. The identity of the Iraqi Contractors Union, valid at the time of bid submission (if Iraqi).
b. A detailed list of similar works that he carried out, with mentioning the entity for which he worked. — *73.3% agree*

Hypothesis 2 – General and special conditions for construction contracting
1. Work approach: Bidders shall indicate in their bids the route, course of action, details, and type of equipment they intend to use in carrying out the work.
2. Work completion duration: Unless the employer determines the duration of the completion of the work in the tender documents, the bidders shall indicate in the tender the time required to complete the work and the bidder on whom the auction is awarded shall be obliged to complete the work within that period. — *66.7% agree*

Guessing and Specifications

1-Enabling the student to be familiar with the process of estimating and specifications, which are necessary for every engineer in the worksite or the planning stage, calculating quantities accurately, and setting bills of quantities for projects, which are the basis for the implementation of any project. / **1-How is the process of estimating and calculating quantities and specifications for buildings?** / **1- Hypothesis 1 –** Approximate or total estimation: It is an estimation of the building as a whole based on the 3M or 2M of the building. This estimation is made in a hurry or short steps, or rather approximately, the project owner may want to know the approximate cost of a project before deciding to establish it, and this type of estimation is not sufficient for tenders. — *66.7% agree* / *66.67% agree*

Hypothesis 2 – A detailed estimation of each part of the building separately. It is prepared after knowing the price of materials and equipment, knowing workers' wages, additional and fixed expenses, and estimating the profit. This estimation must be made by contractors before submitting bids or entering into contracts for important projects. — *60.0% agree*

Contemporary Iraqi architecture

1-The student learns about Iraqi architecture starting from the British occupation period through the most important stages and stations in the contemporary history of Iraq through the temporal and spatial study of local architecture and the extent to which it meets the requirements of / **1-What are the characteristics of Iraqi architecture during the British occupation period? To what extent did Iraqi architecture meet the requirements of identity?** / **1- Hypothesis 1 –** Iraqi architecture during the British occupation period
1- The almost complete absence of the concept of "heritage", as the stage did not witness the emergence of calls for inspiration from the past and the revival of heritage
2- The presence of craftswomen in the architectural production and the use of heritage details and elements borrowed from the ancient Iraqi and Arab architecture using (arches, domes, and arcades, in addition to the use of bricks). — *56.67% agree* / *66.7% agree*

Left column tables

identity.

Hypothesis 2-

1- Artistic focus and singing architectural details are done only on the front faces of the building, leaving other duty treatments with no apparent attention.

2- Attention to the front facade and semi-overlook the other facades. What distinguishes this front facade is the abundance of details and metaphors here and there - both from classic British architecture and traditional local architecture.

46.7% agree

2-Identifying the most important basic features that formed the personality of Iraqi architecture.

2-What are the most important basic features that formed the personality of Iraqi architecture?

2- Hypothesis 1-

The basic features that shaped the character of Iraqi architecture

The use of domes, which were widely used in mosques and shrines, and the domes were small, and their use was limited to covering the places in front of the mihrab, and then spread to the mausoleums. At first, corner contracts were made to facilitate the transition from the square to the octagon, then the muqarnas appeared to address this aspect aesthetically and architecturally.

53.3% agree

Hypothesis 2 –

The entrances, iwans, and ceilings of traditional Iraqi buildings were decorated with decorative elements that were formed from vegetal motifs or with geometrical elements with wonderful intersecting formations and formations to achieve more aesthetics in the form that contains the characteristics of the formation, and it has been enhanced with verses of Arabic calligraphy and plant branches.

60.0% agree

Architectural criticism theories

1-Introducing students to the most important critical theories affecting architecture.

1- What are the most important critical theories affecting architecture?

1- Hypothesis 1 –

The most prominent critical theories affecting architecture

1- Theoretical criticism: It is an expression of individual beliefs known to architects, and this includes: theory, beliefs about what is good or bad.

51.67% agree

2- "self" interpretative criticism: self-criticism depends on the criterion or principle adopted by the assessor and often follows its approach.

46.7% agree

Professional practice

1-To inform the student of the professional practice and the architect's duties towards the profession through his design presentations, first as a thinker and creator, to his field practice as coordinator and leader of the executive team.

1-What are the principles of professional practice and the duties of an architect?

1- Hypothesis 1-

1- The public interest. It is in the interest of everyone, not individuals. It is embodied in achieving justice, social stability, and development.

2- Feeling of belonging to the community. Feeling connected to society and seeking to achieve its interests is a response to the natural human need for belonging, which motivates him to do what the group to which he belongs is satisfied.

3- Conformity of laws, regulations, and systems. Laws are the product of what society wants from acceptable behavior and a deterrent to negative or unethical practices.

53.3% agree

The duties of an architect

• Preparing layout drawings for the buildings, taking into account the internal coordination and the external environment as well.

*Giving advice and instructions to get the most out of the building and fulfill the basic purpose of the building.

58.33% agree

Hypothesis 2-

1- Conscience, which is the balance of sense and awareness that gives the individual the innate ability to perceive good deeds, applaud the good, detest the ugly, follow the truth and reject falsehood.

2- Reasoning. This criterion is manifested in referring to the judgment of practical reason (i.e. related to action), which means realizing that something should be done or left.

- Intervening to find solutions in the event of any obstacles arising during the construction process.

- Final review on the project and ensure delivery as agreed.

- Follow-up and supervision of the project in all its stages.

53.3% agree

Right column tables

Hypothesis 2-

1- Descriptive criticism: aims to present facts about the building or plan. It is usually used to help understand the building or design as an explanation of the project to the owner or user.

53.3% agree

2- Clarify the type of connection between (criticism theory), (architecture theory), and (philosophy) and analyze the relationships between the three aspects.

2- What is the type of connection and relationship between (criticism theory), (architecture theory), and (philosophy)?

2- Hypothesis 1 –

The relationship between (criticism theory), (architecture theory) and (philosophy)

Philosophy is the ideal concept of trying to answer the fundamental questions of existence and the universe. And it's a holistic, rational, systematic way of understanding the truth in its various aspects, which is concerned with basic humanitarian activities.

The intellectual basis of criticism is essentially based on a specific philosophy, that is, a holistic, rational, and systematic way of understanding the truth in its various aspects, with competence for basic human activities.

53.3% agree

Hypothesis 2 –

Architectural theory is the architectural basis of an era of time that is achieved by proof and experience, which is an intellectual activity, where the act of mind remains the cause of the emergence of a theory and is therefore scientific.

Architecture In general, architecture theories are architectural foundations and principles based on beauty measures without compromising function.

The architectural theory provides us with dimensions on which to base our comparison, analysis, and criticism. These dimensions take the nature of empirical generalities, and the analysis of criticism is based on theory. These two activities (theory and criticism) are linked in a relationship, as each one has a specific and correcting activity for the other.

53.3% agree

2-The student recognizes the origins of professional grading through the professional organizations of the Iraqi Engineers' Union.

2-What are the principles of professional apprenticeship in force in the Iraqi Engineers Syndicate?

2- Hypothesis 1-

1. Assistant Engineer: It is the first rank of engineer and its duration is at least four years.

2. The practicing engineer: - Its duration is not less than five years from practicing the profession.

73.3% agree

Hypothesis 2-

1 - A licensed engineer: - Its term is not less than five years.

2 - The consultant engineer: It is the highest classification level for the union's members. The consultant then has the right to assume responsibility for engineering projects, planning and coordinating the work of specialists in the various engineering fields in them, without specifying his specialization.

73.3% agree

Stage five result	56.67% agree

Results:

The first stage:

1. The English language in the answer to the second problem of the first hypothesis appeared to be 40% (neutral) as opposed to 46% (agreed), indicating that the answer to this second problem is not confined to this hypothesis, but that other hypotheses can be developed to answer this second problem. This also applies to mathematics through its second hypothesis and also architectural design through its first hypothesis.

2. The result of the first problem is distinguished by the first hypothesis of architectural drawing at a high rate of (agreed) and (strongly agreed).

3. Architectural drawing in its first problem and through its second hypothesis obtained 53% (neutral), which suggests that the answer to this problem requires the development of other hypotheses.
4. There is a distinction in the manual drawing between the first two problem hypotheses of this substance by weighing the second hypothesis over the first and by 40% neutral and 40% agreed for the first and 46% agreed and 13% neutral respectively, which is matched by 33% strongly agreed for the second hypothesis.
5. In the building materials vocabulary, the first hypothesis of the problem proven in this article was distinguished, with 73% agreed, while we find the weakness in the second hypothesis for the same article, with 46% being neutral and 40% agreed.
6. In the computer vocabulary, we find clear distinction and support for the first and second hypotheses of the proven problem and its final result, and 40% agree strongly with both.

The final result of the vocabulary of the first stage was 45.10% agreed and 20.59% strongly agreed.

The second stage:

1. Architectural design: We find that the second hypothesis of the third problem of this vocabulary has indicated a rate of 33% (neutral). It is because learning to solve symbolic problems in architectural design may be more targeted on one side and more hypotheses are needed to reduce the neutrality of the second hypothesis at hand.
2. Architectural drawing: In the second problem, the second hypothesis is that the ratio (neutral) is up to 47%, which is due to the architectural drawing subject of the second stage achieves its objectives more through actual drawing exercise than theoretical goal formulation.
3. Manual drawing: The third problem obtained through its first hypothesis a rate of 73% (agree) given the direct goal achieved in that hypothesis.
4. Buildings Construction: The second hypothesis of the first problem obtained 33% (neutral) because of the large size of the proven target and the size of the problem arising.
-   The third problem, through its first and second hypotheses, obtained high rates of 53% and 46% (agreed) respectively, was due to the clarity and directness of the educational objectives required by the text of the problem arising.
-   The first hypothesis of the fifth problem was 53% (neutral) given how much potential can be given to the same problem, and therefore what is given to solve that problem is relatively minor. The same is the case with the first and second hypotheses of the previous problem for this term (construction of buildings).
5. Design methodology and logic: The first and second hypotheses of the second problem got relatively high rates, which are 53% and 46% (agree) given their direct and accurate investigation of that problem, as well as the first hypothesis of the third problem for the same problem.
6. Architecture age: The first hypothesis of the first problem was 40% (strongly agreed) given its direct and precise investigation of that problem as well as the first hypothesis of the third problem of the same problem.

The final result of stage two vocabulary was 42.60% agreed and 16.15% strongly agreed.

The third stage:
1. Buildings Construction: The first problem with its first and second hypotheses achieved a neutral rate of 53% for each of them due to the weakness and limitations of those hypotheses compared to the text of the first problem.
2. Architecture age: The first problem with its first hypothesis achieved 53% given the start of the hypothesis for the problem at hand. As well as the third problem with its first hypothesis, it received 60% (agreed) for the same reason.
3. **3D Max computers, construction, and urban planning:** Most of its hypotheses obtained high rates (agreed) given the clarity of the objectives of the article and thus its problems and hypotheses formulated by the result.

The final result of stage three vocabulary was that 46.57% agreed and 17.8% strongly agreed.

The fourth stage:
1. The academic vocabulary (architectural design, interior design, housing, architecture theory II, architecture theory (postmodern), outdoor spaces, architecture and climate, building techniques, interior design, engineering services, and sustainable architecture got high rates of (agree) because of the clarity of the cognitive objectives of that academic vocabulary, which led to the identification of clear and solvable problems as well as accurate hypotheses to solve those problems.
2. Architecture and Society has a rating of (53%), given the weak hypotheses for answering problems specific to the cognitive objectives of this subject.

3. Architecture acoustics vocabulary, through its second hypothesis, got a rating of (60%) (agree), given that it directly answers the second epistemological problem, besides, this vocabulary falls within the field of applied sciences, which is characterized by the objectivity of its standards.

The final result of the fourth stage vocabulary was agreed with a percentage of 56.19% agreed and strongly agreed with a percentage of 21.27%.

The fifth stage:

1. Architectural design: this vocabulary was supported in high proportions by its problem and by the full amount of details of the two hypotheses of this problem. The ratio was (strongly agreed) (40%) for the first hypothesis and an estimate agreed (40%), the second hypothesis was (strongly agreed) by 33% and (agreed) by 46%.
2. Contemporary Arab Architecture: Through its estimates, this vocabulary obtained a Lickert ratio (60%) for its first hypothesis and (66%) for its second hypothesis given the clarity of the objectives of the cognitive material about which the problem was formulated and then the hypotheses that directly answer the problem of this study vocabulary. The second problem hypothesis received (agreed) with a percentage of (80%).
3. Philosophy of architecture: due to the considerable expansion in the details of this first and second study vocabularies to answering the first problem, it received relatively high support (53%) and 60%). The second, whose first hypothesis was supported (33%) (Strongly agreed), was reduced in the second, given the weakness of the hypothesis in answering its problem.
4. Conjecture and specifications: This vocabulary obtained high ratios to answer the problems of this article and the two hypotheses prepared for each problem, as follows (66%, 60%, 73%, and 66%) (Agree). This has been achieved because of the clarity of the problems formulated, and therefore the hypotheses underlying them, which have struck the problems directly.
5. Contemporary Iraqi architecture: This study vocabulary with the theory of architectural criticism as well as the practice of the profession expression through its two problems formulated based on the objectives of the article and given the accuracy of the details of its four hypotheses obtained ratios ranging from 66% to 46%, 53% to 60% (agreed).

The final result of stage five vocabulary was that 56.67% agreed and 19.44% strongly agreed.

Conclusions

The first stage
1. Given the wide range of goals set for some vocabulary, such as English language, architectural design, and drawing, since one can agree on the desired goals for this vocabulary, its hypotheses have achieved a ratio (neutral) at the micro-level.
2. A distinction can be made between the result of the hypotheses formulated (higher and lower) to answer the same problem and the same material as in the first stage (architectural drawing) and (building materials) of the first stage.
3. A distinct (high) proportion of solutions to the problems of certain vocabulary can be diagnosed by its hypotheses, as in the case of computer vocabulary. This has been achieved by the high agreement on the educational objectives of this subject and the consequent problems and its hypotheses.

The second stage
1. The situation varies in the second stage in terms of the formulated hypotheses for solutions to cognitive problems. There have been instances that are quite good (neutral) to what has been formulated, which may be due to the lack of cognitive accumulation of second-stage students requiring further revision in the formulation of cognitive problems and hypotheses as in the architectural design and drawing vocabulary as well as the construction of buildings vocabulary which affirms the weakness in the formulation of some hypotheses indicated, several of which were supported by more than (50%), as in the concept of constructing buildings in its third problem.
2. The accuracy of the formulation of problem-solving hypotheses can contribute to a degree of support (agreed), which is reflected in the vocabulary (design methodology and logic) and (architecture History II).

The third stage
- As the school stage progresses, there is difficulty in some of the vocabulary in transforming its goal-derived cognitive problems into solvable hypotheses, as in the vocabulary of constructing buildings III, The above is not a static case, as the terms (Architecture History III) and (Computers 3Dmax) got high percentages (agree) with their formulated hypotheses.

The fourth and fifth stage

- Many vocabularies have gained support for problem-based learning by transforming the cognitive goals of this vocabulary into solvable problems through supporting hypotheses for the learning process. The researcher attributes this to the high amount of knowledge for students at this stage, which has led to a degree of endorsement (agreed) and in distinct proportions by the professors responsible for these subjects.

Recommendations

- The research recommends the adoption of a problem-based learning strategy in architectural education, given the support demonstrated by the results and findings of the research for the PBL mechanisms.
- The research recommends shifting the sample tested by professors to students to see how they interact with the mechanisms adopted in the PBL strategy.
- The research recommends checking the cognitive goals of the study module, which is the most important key to communicating information whether at the cognitive, skill, or attitude level.
- The research recommends that the hypotheses on cognitive problems derived from the educational objectives of study materials be reviewed to verifying their effectiveness after starting classes and constantly updating them whenever possible and making use of the feedback process of students when presenting the study course.
- The research recommends mixing different learning strategies to obtain the maxim of the desired benefit from that studying vocabulary.
- The research also recommends the activation of more than one learning strategy based on the different nature of subjects within the field of natural or normative sciences.

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