

THE COGNITIVE STAGES OF MEMORY IN THE ARCHITECTURAL PRODUCT: COMPARISON OF MENTAL AND SPIRITUAL KNOWLEDGE IN THE PRODUCTS OF ARCHITECTURE STUDENTS

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Abstract

Memory is one of the most important human cognitive processes that include attention, perception, storage, retrieval, and rebuilding the past to form an independent identity for it by processing the information as a communicative learning process between the past, present, and future. The characteristic of the interface between mental knowledge and spiritual knowledge has been adopted in the relationship between the latent (invisible) system that represents the causes towards the images and the visible system represented by the changes in the forms, as the causes represent the relationship between the subject and the object in the cause (teleological, active, physical and imaginary), and this relationship appears in the form of a visible system whose pillars were concentrated in (method of thinking, concepts, material, form), as these pillars have the characteristic of correlation between the causes of the latent system. On the descriptive side, which is represented in the subjective, the goal or way of thinking that represents the teleological cause in the latent system is a reason for the emergence of concepts representing the active cause in the latent system forming the active idea. As for the synthesis side, which is represented in the objective, the material representing the physical cause in the latent system with its overlapping elements will be the appearance of the model image representing the formal object in the latent system. Mental and spiritual knowledge was measured through the cognitive stages of memory represented by conversation, behaviour, emotion, and recollecting that the student of architecture adopts in architectural projects. The research problem is represented in the apparent discrepancy in the students' handling of the architecture department with the cognitive stages associated with memory when preparing architectural projects. The research aims to know and identify the cognitive stages associated with memory when preparing architectural projects through the identification of mental knowledge and spiritual knowledge. The research concluded that recollecting is the focus of the cognitive processes of memory, as the idea of extracting by conversation, the idea of emotion by sensory, and the idea of behaviour by mental.

Keywords: Architectural product, Behaviour, Cognitive stages, Conversation, Emotion, Memory, Recollecting.

1. Introduction

Memory was one of the most important topics because it plays a central role in a person's psychological and social life. Memory is the basis for the supremacy of this rational being over the realm of assets. It is the source of its privacy and uniqueness, as it uses it in various aspects to accommodate, store and employ the various information it receives from the outside world.

Memory refers to two aspects, the first is the recollection, which is all that comes to mind from the movements and mental images, and the second is remembering, it is a memory tool and consists of a rotational process centred on memory and deals with mental images, ideas and meanings through the stages of coding, storage and retrieval.

Memory is a cognitive mental process, which directly affects human behaviour and is linked to other cognitive mental processes, such as attention, perception, thinking imagination, and cognition, and is also affected by many factors, variables, habits, disorders, and diseases [1].

Memory is closely related to the individual; The individual mind activates an event or previous experience, or it is forgotten and erased. In a more modern view of the term memory, it can be considered a subjective matter, which we can highlight from the individual by modifying it (a memorial) and qualifying it when we look at the collective meaning of remembering [2].

Public memory requires a public place, a public presence, public discussion, a common topic, and commemoration in place for its constitution. Although there may not be any inter-personal ties among the public, the given features together mediate the formation of this kind of memory. Consequently, this mediation for public memory can be considered to be internal to the public itself [3].

Memory types are divided according to the storage period, the importance of the event, and the processing of information and each type includes a specific function it and according to a hierarchy, it starts from the sensory memory and ends with long-term memory, and its importance in the process of storing information and retrieving it through visual, audio or semantic coding meaningful after passing Information by encoding, storing, processing and perception, which helps in decision-making, problem-solving, derive new information and create it [4].

The research aims to know and identify the cognitive stages associated with memory when preparing architectural projects through the identification of mental knowledge and spiritual knowledge.

The research methodology is based on the comparative approach between mental knowledge and spiritual knowledge for a group of projects that graduate students of architecture through a questionnaire to measure 4 variables (conversation, emotion, recollecting, and behaviour) using an Excel and AutoCAD program, to know the sequence of these variables when designing graduation projects, and to know the amount of displacement between Mental and spiritual knowledge.

2. Literature Review

Psychologists present models to serial, for the mechanism of processing information in the mind in which each stage (Cognitive knowledge stages) takes a

period of time that depends on the type of phenomenon or problem, and depends on perception and cognition stimuli, on the information stored in memory. And on the nature of that information, as it and in some of its stages need more attention. One of the most important theoretical models that dealt with memory in the supplying and processing of information are:

(a) Hunt's model in 1971 [5].

Hunt believes that the brain has an explicit physical structure, and an implicit logical structure, which he calls the system architecture or systematic. These physical structures that make up this system are activated by the control processes that are similar to the program in the computer, and the control processes in this system are used to process and deal with the data that is stored in a purely logical organization called the Data Structure.

Short-term memory and long-term memory are concepts within the system because they include fixed storage means that can be used in certain ways. The encoding strategy is a control process, while the methods for storing data in linked assemblies are data structures. Hunt proposes a theoretical model of memory that he calls the Distributed Memory model, and it consists of two categories of data retention stages:

- First category: Peripheral Buffering.
- Second category: Central Memory.

In this it is assumed that the information provided by the environment passes through a series of stages of blocking and each step of them includes re-encoding and is in essence an interpretation of the current input in the light of previous experience, and it must be noted that the re-encoding process requires the availability of a repertoire of data in the central memory. Thus, human memory is distributed between the structure of the previous data (experience) and the present and depending on the type of data and the degree of emotion that it performs and the extent of its impact on the retrieval of data and conversations (input) and how it is processed (re-encoded) and what interacts with the data stored in memory.

(b) Carroll's model in 1976 [6]

Carroll identified ten types of cognitive components used in response to test questions:

- Self-Monitoring Process: It is the process of identifying desire, improve processing, and better monitoring the effectiveness of performance.
- Attention: It is the process by which the individual notices the type and number of stimuli he/she receives while performing the task, due to the abundance of data he/she receives from his/her sensory systems.
- Apprehension: The process used by the individual to record stimuli in the sensory recorder.
- Perceptual Integration: It's the process by which the stimuli are perceived and the perceptual closure of the stimuli and matched with any previous representations stored in the memory.
- Encoding: It's the process of forming mental representations of stimuli for the purpose of interpreting them based on their components, characteristics, and meanings according to the information that is stored, represented and retrieved.

- Comparison: It's the process used to determine if the stimuli are similar or different (overlapped stimuli, and stored stimuli) as previous subjective experience or determining the possibility of describing it by the same source.
- Co-Representational Formation: This process is used to create a new representation of memory by linking it to pre-existing representations of the individual.
- Co-Representational Retrieval: This process is used to create a specific representation in memory and correlate it with another representation on the basis of coherence and its rules.
- Transformation: This process is used to transform or change the golden representation on a predetermined basis.
- Response Exaction: This process is used to work with some mental representations to arrive at a specific response.

Attention represents the first stage of emotion and data exchange by recollecting the stored data in addition to previous experience, leading to the stage of cognitive integration of the data for the purpose of encoding it, and thus identifying similar and different representations between new stimuli and the cognitive store to reach a specific response, which in turn is reflected in the behaviour.

(c) Sckmeck's model in 1977 [7]

Sckmeck et al. research in the field of human information processing and memory represented by perception, organization, processing depth, retrieval strategies, and the result of these researches:

- People remember information better when they process it in depth, which includes devoting attention to meaning and categorizing the idea that this symbol implies.
- The detailed and expanded processing refers to the way information is processed to make it richer.

Human memory goes through a set of perceptions when seeing a specific stimulus, which in turn plays a role in the retrieval of data and its relationship to the student's past and current experience and how to process it in a way that indicates the symbolic meaning, taking into account the cognitive disparity between one student and another.

(d) Brawn's model in 1978 [8]

This model divided the basic cognitive processes into two types:

- Meta-Cognitive Processes: These are executive skills used to control and direct the process of information processing in an individual, meaning that they are functions of executive control in directing perception, attention, choosing appropriate cognitive strategies, solving problems, and monitoring the success of strategies. Brawn identified five meta-cognitive processes of particular importance in an information processing system, which are: planning, monitoring, testing, revising and evaluation.
- Cognitive Process: Skills used in employing operational strategies in working on the performance of processing tasks.

Cognitive stocks vary from one student to another and based on what each student possesses of skills and previous experiences and its active role in directing sensory perception to reach cognitive awareness and its reflection on behaviour to reach certain strategies and a method for coding memories in addition to individual skills and how to employ these strategies to produce the response.

(e) Sternberg's model in 1985 [9]

He presented a cognitive model consisting of three elements, these elements consist of:

- Beyond the elements: Supreme control processes used to implement planning, control and evaluation of the individual's performance of the task.
- Performance Elements: Minimum processes used in implementing the various responses when performing the task, and these elements include:
 - Inference: It means to infer the relationship between two stimuli that are similar in one aspect and differ in another.
 - Coding: It means giving a formula and a symbolic image of the nature of the introduced stimulus to give a compatible image of the other coded stimuli and the nature of previous inference relationships in new situations.
 - Application: Means the application of evidentiary relationships in new situations.
- Elements of knowledge acquisition: They are the processes of learning new information, acquiring it and storing it in memory. Sternberg believes that the elements that are more important in the knowledge acquisition process are:
 - Selective coding: It is the process of isolating new information entering into memory and having a relationship with a specific topic of concepts and vocabulary that is not related to it, according to the achievement of a specific goal in the educational situation.
 - Optional assembly: It is the process in which coded information is collected optionally according to a specific method, which increases its internal cohesion or cohesion.
 - Optional balance: It is a logical link between experiences and information previously coded in memory with newly coded information, in order to increase its relevance and integration with the new knowledge structure or the previously formed knowledge structure.

Previous experiences and knowledge inventory plays a major role in implementing the response by inferring the similarity between stimuli and then giving a symbolic image of the nature of the stimulus and inferring conversations and recollecting information to reach the link between past and current experiences and then implementation, taking into account the individual differences of students in processing information.

It is concluded from the foregoing that the models in general emphasized the cognitive processes that the student of architecture undergoes, which are used in employing appropriate strategies and solving problems during the design process, that is, how to know the relationship between external stimuli and how to relate them to previous experiences, and previously and current coded information, That is, the interconnected effects of information starting from the conversation about the symbolic meaning of the stimulus and how to classify it, up to the stage of recollecting and compatible with current needs and requirements.

3. Cognitive Processes of Memory in the Design Process of the Architecture Students

The memory belongs to a part of the spirit to which the image belongs, and therefore most of the cognitive processes performed by the student are psychological, and through the sudden interconnection of scattered and divergent ideas in the unconscious, from which students select the most appropriate ideas and convey them to consciousness, a process called (attention) [10], which is the basis of this whole of perceptive processes on the one hand, and the cognitive processes are related to the emotional field on the other [11]. There are five tools help to learn is (motivational tools), or the most important aspects of motivation for architecture student (interest in the studio design/interest in improving performance / importance of a theoretical lesson in achieving a student’s educational goals / The student's tendency towards a problem or his feeling of what needs to be achieved by learning it in the studio / attention to the work itself [12].

Figures 1 to 3 show the relationship of types of memory to the student's cognitive processes, how to process information, make decisions, solve problems and derive new information and create it during the design process for the student of architecture. As the individual memory (subjective aspect) and the student's past experiences interact by retrieving the previous information (visual or audio) in various ways, coding it and linking it to the design problem through the presence of external stimuli and addressing it, thus achieving the response by taking the appropriate decision to solve the design problem [13] (the student's architectural product).

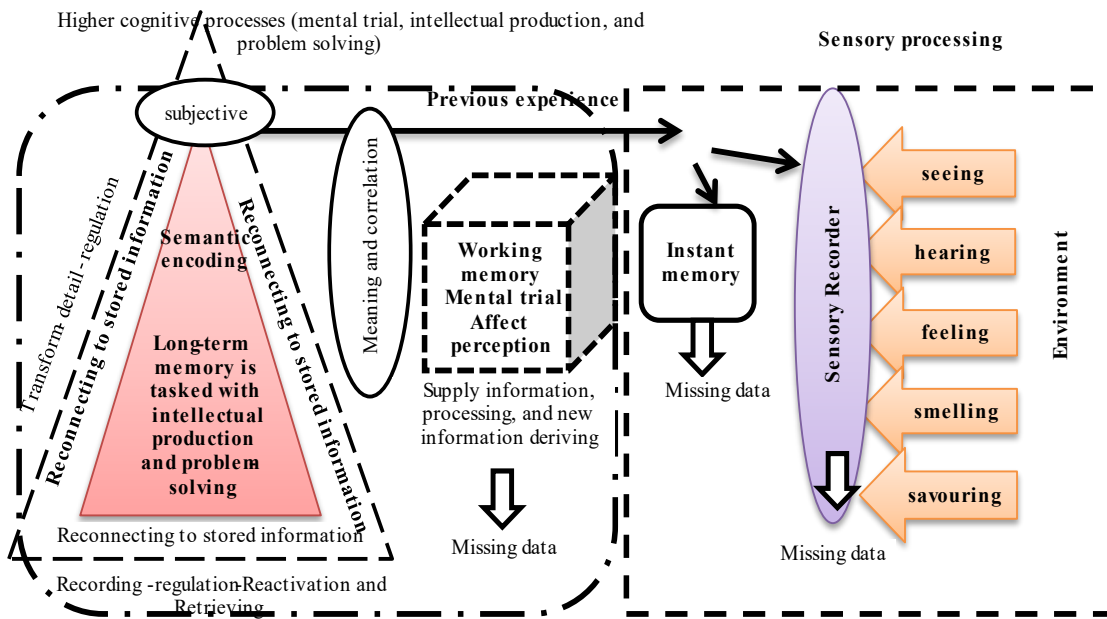


Fig. 1. Model of information processing in working and long-term memory (Author based on [13, 14]).

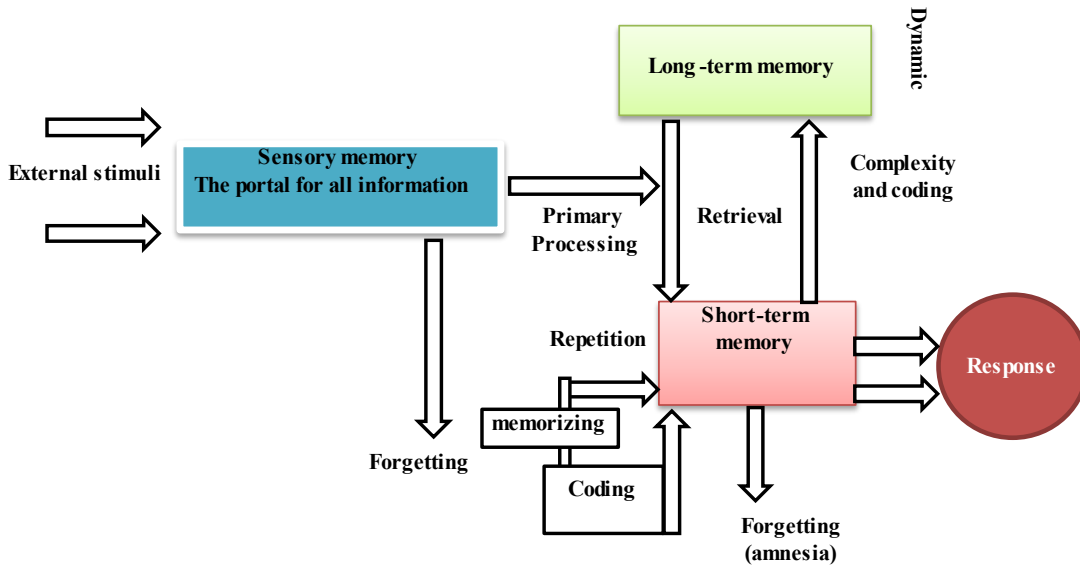


Fig. 2. The memory process [15].

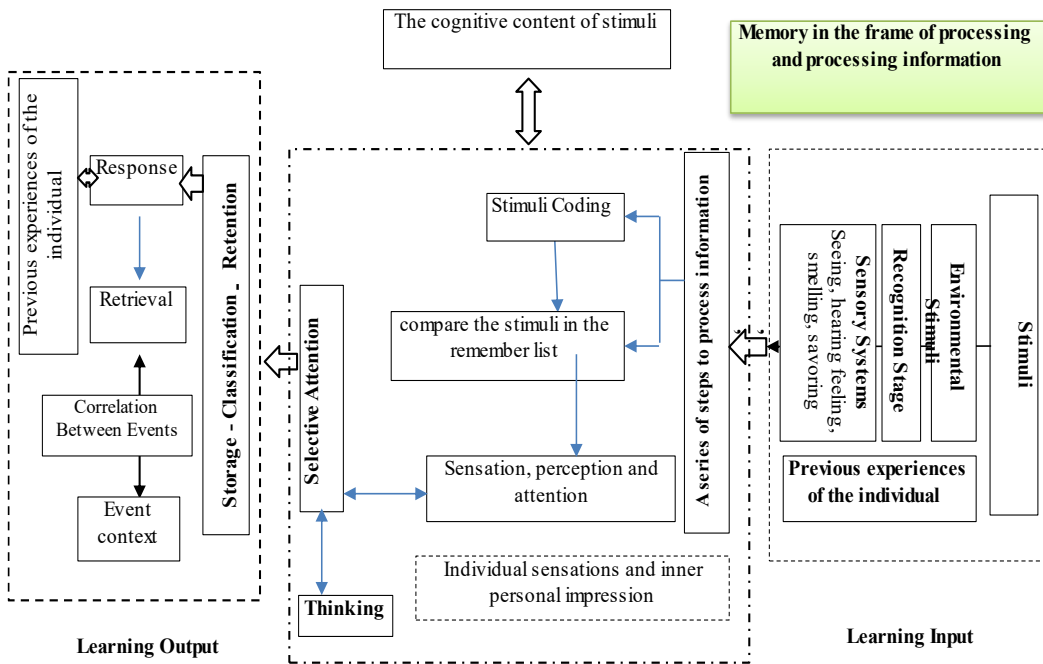


Fig. 3. Stages of information processing by cognitive processes (Author based on [14, 16]).

Through literature review, it was found that there are four activities related to the cognitive process of memory that work on knowing the logical sequence of the student's thinking, which are [14]:

i. Conversation

It represents the concentration of mental energy to reach a decision, as it is the directed process and at the same time selective and depends on the interaction of many factors and variables in its formulation. Among these factors are what is related to the recipient from previous cognitive and perceptive experiences and cultural and social factors in addition to psychological factors and what are related to the needs, motives and goals, in addition to the factors that is related to the external environment, shape and its characteristics.

Cognitive people indicate that thought begins its effectiveness as the information it receives from its external surroundings by the action of sensory stimuli, and the person begins to expand on this information and explain it, by adding to it the experiences and knowledge of previous memories to explain its causes or predicting its results, and then move the thought to decide what to do about that information, and it sets a plan to implement the work and direct the implementation process, and the matter may not stop there, as the matter may lead to making another decision regarding a new stimulus that arose after the implementation of the previous plan, and the development of a new plan and directing the work during the implementation of that plan and thus continue in sequence.

Attention is related to the student's mental perceptions, which remain in his / her memory through repetition and conversation, and the division of mental perceptions into two parts: primary and secondary perceptions. The primary perceptions are the imaginal basis of the human mind, and these perceptions are generated from a sense of their levels directly. Based on this rule, the mind creates secondary perceptions, thereby initiating the role of innovation and creation, and the mind generates new concepts from these primary meanings, and these new meanings are outside the energy of the sense even if they are deduced and extracted from the meanings that sense provides to the mind and thought [16].

ii. Emotion:

It is a perception phenomenon of unexplained information. The emotional aspects of human mental and sensory life are expressed by feelings, which are reflected in attitudes taken by humans against different environmental phenomena, as they are subjected like other bodily organs to the activity of the cerebral cortex. Emotions are an inevitable part of interpersonal communication. They can be expressed in many different forms, which may or may not be observed with the naked eye [17].

Theorists use the term “emotional thought” to reference the matrix of processes such as memory, decision making, motivation, learning, and creativity that are integrated with emotion to contribute to knowing [18].

Intuition, which is based on an innate basis, plays an active role with emotion as an emotional shock that requires the distinction between two types of emotion associated with emergence of ideas (Fig. 4):

- Superficial emotion: It's the emotional state that results from a state of mind that self- sufficiency, which is represented by the emotion or feelings that follow the emergence of an idea or a representative image.
- Deep emotion: The passion that doesn't result from a perception but is itself the cause of the emergence of several perceptions, It's the driving force that

pushes the integrated planning and by which we mean intuition (which offers the artist only possibilities), towards actual verification of the reality of the artist according to the identity of this planning and the material through which it is expressed. Thus, the task of emotion is to evocation memory, so the images that fill them will spread, and then the artist will take from among these images what is appropriate for the general planning that is being verified and caused by intuition.

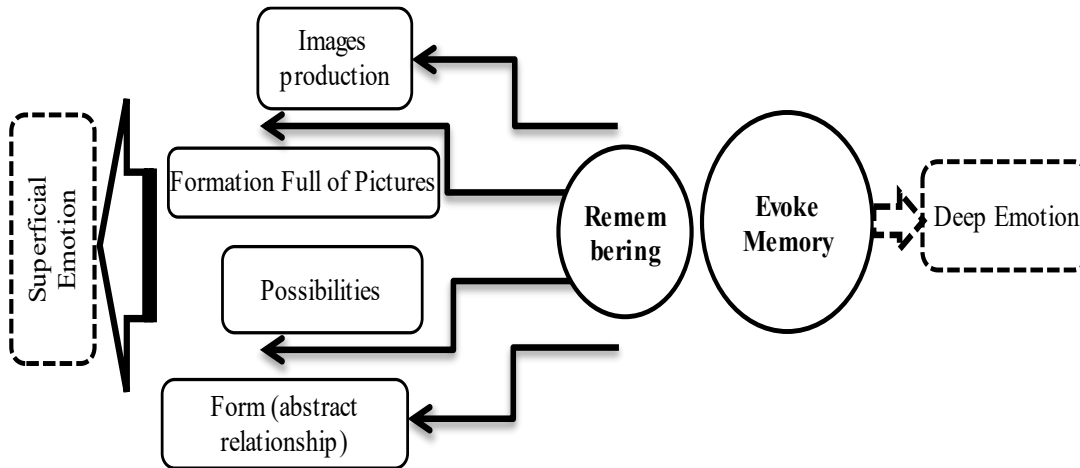


Fig. 4. Types of emotion (Author based on [17, 18]).

The architectural designer faces emotional situations as a result of previous excitement related to the emotional aspects, and here artistic creativity may appear, or not appear, because it is affected by many factors, variables and habits associated with the designer.

iii. Recollecting

It is a cognitive process that occurs in the mind and leads to directed Behaviour upon the understanding or realizing a certain phenomenon. It has been found in the history of psychological thought from researchers, who sees it as a symbolic mental activity, while others see it as an imaginative activity, it is one of the mental processes used by the individual in dealing with the information and data that he perceives sensually and cognitively. That is, the information that is perceived cognitive and sensory, thinking is conducted upon it, as recollecting is closely related to all other cognitive mental processes, and the most important of these processes are memory and remembering, as they are the most important cognitive processes supported by the architect, considering memory is the cognitive storage of the student, and the store that calls from him the designer his / her responses, it contributes to the structure of the mental plans of the student.

When the student thinks about a particular situation, he / she often resorted to the imaginal activities and the processes of creating shapes in his / her mind, which take the place of the spoken language for others, and thus perceptive the aspects of the situation and the relations between them by external observation and process of things with the actual kinetic process, and remembers the past with his / her

experiences that are related to it, and takes image future changes that you get. Here, imagination plays an important role in shaping perceptions of the student, and the process of dialogue between the student and his / her ideas. Perceptions are described as comprising two types of cognitive elements:

- Represented by ideas that are specific intellectual elements resulting from apprehension, observation, or intuition, related to the general structure of the problem, and the extent to which it is affected by educational curricula, and remembering and recollecting.
- cognitive hints: These are insubstantial cognitive formulas, less rigid, and more random, related to a specific view of a particular topic in the design problem.

Therefore, it is necessary to find a general description linking the entire mental processes that store and process data with cognitive processes and are associated with a major source of all the input in the mind of the architect and his imagination, who learns architecture and various sciences during his / her scientific culture in the architectural school to which student belongs, to reach out to the visual products that conveys the cognitive content. Considering the drawings and plans embodied in the form of an image, it is a store of information through which the mind conducts collective communication.

iv. Behaviour (sensory perception)

The student's sensory organs are perceptual systems, which organize all perceptions (motivational features) into patterns of lines, levels, and symbolic forms, to form and judge the form. As every perceptual organization is the organization of a shape on the ground by adopting the context (general positioning), and the perception of shapes by symmetry as a philological characteristic based on imaginal similarity, and depends (similarity, convergence, closure, continuity), as perceptual relationships built in the mind, to reach the distinction of the form And including it within classifications, which allows the derivation of additional information about the characteristics of the form (hidden information), so that the shape acquires the characteristic of the subject, given that the nature of the stimulus, the physiology of the mechanism of perception, the psychological state of the student, his / her expectations and his / her selectivity, in directing his / her attention according to his / her motives, memory, and cultural influences, overlap All of which together make up the effects of the perceptual process (Fig. 5).

The process of sensory perception is essentially purposeful, and directed by cognitive perception, therefore what is perceived cognitively is sensory perceptive, perception is a structuring process that seeks after meaning, and the perception of any formal pattern is through the cognitive pattern, as students absorb the information or simulate it and classify it in In light of what they already know, which is the process of building the called mental plans through which the student sees his / her world as a conceptual moral building. And the use of the concept of shorthand for these plans, to reach the perceptive response first, and thus represents a moral response affecting the Behaviour.

The aesthetic sense occurs in the architectural product from the order of the perception (perceptual form relations), with multiple shapes and patterns, and when the arrangement of these perceptions is matched with the emotional state, it can be said that the feeling or sense has given an expressive formation (Fig. 6).

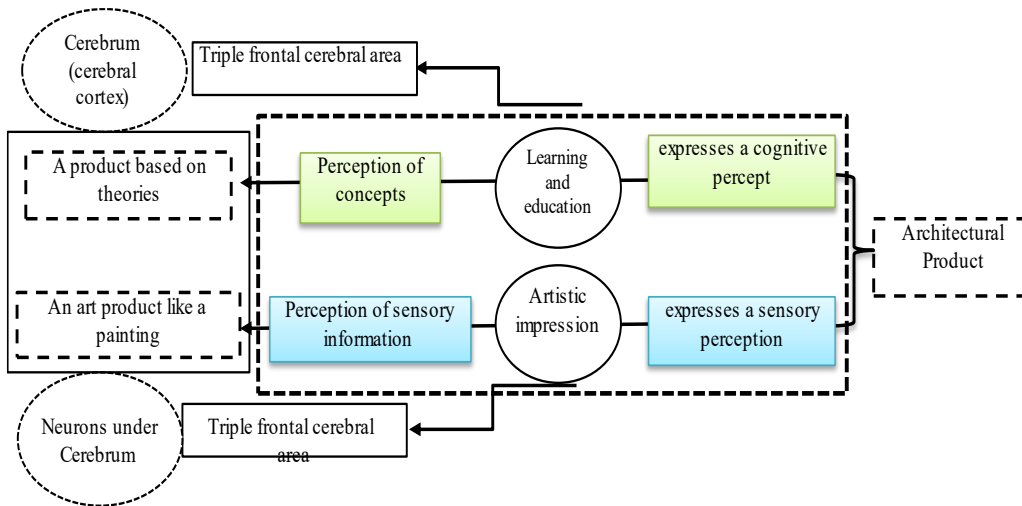


Fig. 5. Behaviour and Architectural education.

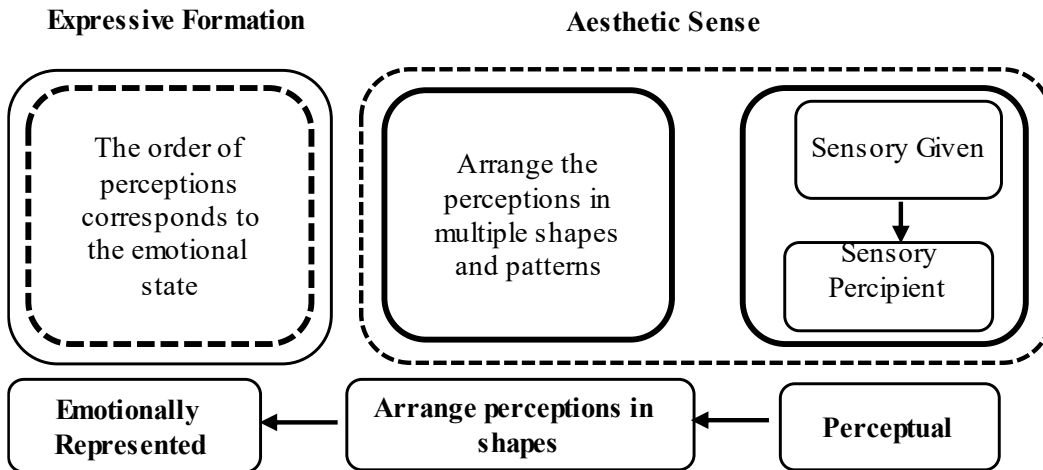


Fig. 6. Aesthetic sense and architectural formation.

4. Mental Knowledge and Spiritual Knowledge

There are two centres in the human soul, and each of them originates from a specific type of activities and spiritual manifestations, and one of these two centres is called (the mind) or (wisdom), and the other is called (the heart) the instinct. Thought, thinking and insight, logic and Inference, science and philosophy, are all manifestations of the mind, and there are spiritual or psychological manifestations, such as desire, love, wishing and emotion, and all of these are attributed to the heart [19].

Spiritual knowledge is the direct result of the process of thinking about existence, and searching for meaning and purpose in our lives, a process based on deeply held personal values. Spiritual knowledge is in a continuous dynamic with mental knowledge, and it powers the decision-making process [20].

They share the instinct (spiritual knowledge) and the mind (mental knowledge) in two levels: the level of participation in saving the state of consciousness, which is that the designer has a consciousness that helps him / her reach the reality of accepting the formation before others. And the level of cooperation of the instinct, which represents the simplicity of the human being, with the mind in shaping that represents accuracy to reach acceptability. As they have an integrative relationship, that is, they integrate and unite in the cognitive direction achieved in the product designer. Or the psychological direction achieved in the recipient, linked to the conditions of the integrity of the composition, the clarity of the same designer, and the attention to knowledge and its evidence. In other words, instinct is an esoteric structure that exists in every human being and a not material structure that contains a set of absolute ideas and principles. As opposed to the mind or thought for perception and inference, as a perceptual organ that is neither physical nor sensible, and what it contains in process of storing, remembering, visualizing and believing [21].

Spiritual knowledge constitutes the third component of the triple helix of knowledge. If rational knowledge reflects our understanding about the physical world we are living in, and emotional knowledge reflects our understanding about our bodily emotions and feelings, spiritual knowledge reflects our understanding about the meaning of our existence. It goes beyond the tangibility of our body and of external environment. Integrating the mental knowledge, emotional knowledge and spiritual knowledge into the triple helix of knowledge it will help us to discover the richness and significance of what is of value in this life. Knowledge is an intangible asset that is processed by intelligence and not by technological equipment, like the physical raw materials [22].

That is why educations should not be limited only to mental knowledge but extended to emotional knowledge and spiritual knowledge [5].

5. Results

The research was based on the distribution of two questionnaires forms for a sample of 10 students in the fifth stage in the Department of Architecture - Al-Mustansiriya University, the first form for spiritual knowledge of six variables when preparing for graduation projects (project concept, project activities, project function, project needs, building the concept, beneficiaries), And the second form is for mental knowledge of these variables.

The analysis of the results is based on (Excel, Auto CAD) software. To extract students' opinions, and to know and measure students' cognitive stages and how to employ them and use them in the design process according to the sequence of event dynamics through the student's memory with variables such as conversation, behaviour, emotion, and recollecting.

The research relied on knowing the sequence of these variables in the projects of architecture students through their sequence from 1-4.

5.1. Analyzing the spiritual knowledge form for students' graduation projects

The architectural design process depends on a set of variables, in which the spiritual and mental knowledge of the student is measured. Every architectural project is

based on a design concept that includes different activities and a specific function as a result of the need for it and is designed for a group of beneficiaries

The questionnaire was distributed to the sample, and the students' results were for the variables as shown in Table 1.

Table 1 and Fig. 7 show students' opinions of their graduation projects in highlighting the spiritual knowledge of the sequence of variables for the student to know the cognitive stages of memory in the architectural design process and how to employ them spiritually, as follows:

i. Project concept: The sequence of students' responses showed that students depended on the conversation when starting the project concept by 31%, followed by emotion and Behaviour by 24%, and finally the recollecting by 21%.

ii. Project activities; The sequence of students' responses showed that 27% depended on the conversation when starting to prepare the project activities, followed by emotion at 26%, Behaviour at 25%, and recollecting at 22%.

iii. Project function: The sequence of students' responses showed that 28% depended on emotion when starting the project functions, followed by the rest of the conversation, Behaviour and recollecting variables at 24%, per variable.

iv. Project needs: The sequence of students' responses showed that 29% depended on the conversation when preparing the needs and requirements of the project, followed by emotion at 25%, Behaviour at 24%, and recollecting at 22%.

v. Building the concept: The sequence of students' responses showed that 30% depended on the conversation when building the concept of the project, followed by emotion at 27%, recollecting at 25%, and Behaviour at 18%.

vi. Beneficiaries: The sequence of students' responses showed that 29% depended on the conversation when determining the beneficiaries of the project, followed by Behaviour at 25%, emotion at 24%, and recollecting at 22%.

Table 1 shows that the rate of the sequence of variables started with the highest rate of 28.3%, which is a conversation, followed by emotion at 25.7%, followed by behaviour by 23.3%, and finally recollecting by 22.7%.

5.2. Analyzing the mental knowledge form for students' graduation projects

The questionnaire was distributed to the sample, and the students' results were for the variables as shown in Table 1. Table 1 shows the percentages of the questionnaire variables as follows:

Table 1 and Fig. 7 show students' opinions of their graduation projects in highlighting the mental knowledge of the sequence of variables for the student to know the cognitive stages of memory in the architectural design process and how to employ them Mentally, as follows:

i. Project Concept: The sequence of students' responses showed that students' dependence on a conversation when starting with the concept of the project by 28%, followed by recollecting by 27%, followed by behaviour by 23%, and finally emotion by 22%.

ii. Project activities: The sequence of students' responses showed that 29% depend on a conversation when starting to prepare project activities, followed by behaviour by 27%, emotion by 25%, and recollecting by 19%.

iii. Project function: The sequence of students' responses showed that 28% depend on a conversation when starting the project's functions, followed by emotion by 26%, followed by behaviour by 25%, and finally by 21% of recollecting.

iv. Project needs: The sequence of students' responses showed that 29% depend on a conversation when preparing project needs and requirements, followed by recollecting by 27%, emotion by 24%, and behaviour by 20%.

v. Building the concept: The sequence of students' responses showed that 28% depend on a conversation when building the design idea of the project, followed by behaviour by 26%, emotion by 24%, and recollecting by 22%.

vi. Beneficiaries: Beneficiaries: The sequence of students' responses showed that 27% depend on recollecting when determining the beneficiaries of the project, followed by behaviour by 26%, conversation by 24%, and emotion by 23%.

5.3. A comparison between mental knowledge and spiritual knowledge at the macro level

Table 1 show that the conversation and emotion variables are the highest percentage of the behaviour and recollecting variables in spiritual knowledge, while the conversation and behaviour variables have the highest percentage of the recollecting and emotion variables in mental knowledge.

And the final sequence of variables within mental knowledge and spiritual knowledge was represented by the highest rate of 28% for conversation, followed by emotion at 24.8%, followed by behaviour at 23.9%, and finally recollecting by 23.3%.

Table 1. The percentage of the questionnaire variables for spiritual knowledge and mental knowledge.

	Knowledge	Conversation	Behaviour	Emotion	Recollecting
Project Concept	Spiritual	31%	24%	24%	21%
	Mental	28%	23%	22%	27%
Project Activities	Spiritual	27%	25%	26%	22%
	Mental	29%	27%	25%	19%
Project Function	Spiritual	24%	24%	28%	24%
	Mental	28%	25%	26%	21%
Project Needs	Spiritual	29%	24%	25%	22%
	Mental	29%	20%	24%	27%
Building the Concept	Spiritual	30%	18%	27%	25%
	Mental	28%	26%	24%	22%
Beneficiaries	Spiritual	29%	25%	24%	22%
	Mental	24%	26%	23%	27%
Average	Spiritual	28.3%	23.3%	25.7%	22.7%
	Mental	27.7%	24.5%	24.0%	23.8%

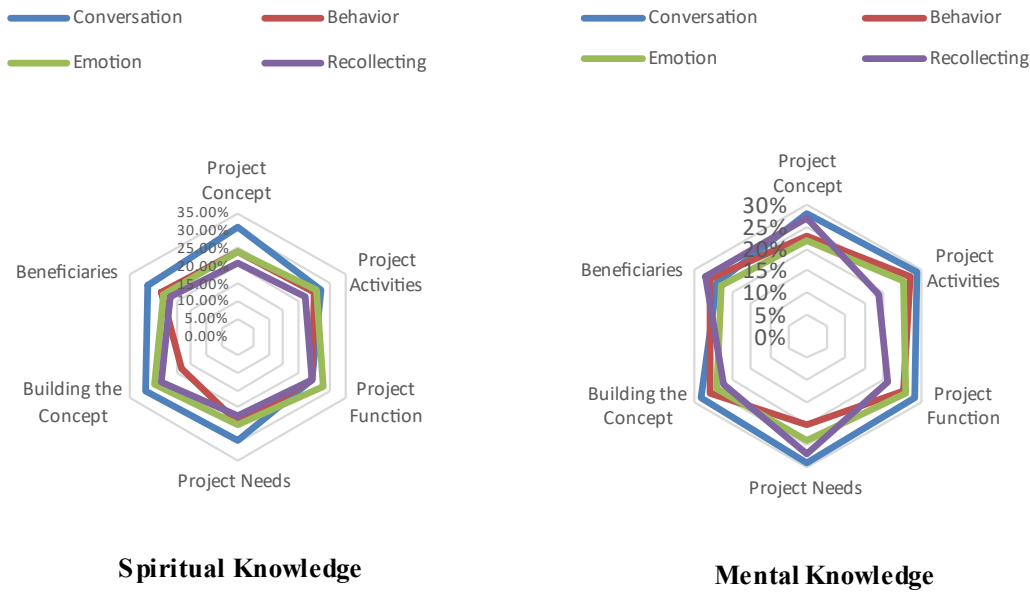


Fig. 7. Results of the questionnaire for spiritual knowledge and mental knowledge.

6. Discussion

6.1. The relationship between mental and spiritual knowledge in architectural education

The concept of the latent system that represents (causes) towards images, and the visible system represented by (changes) towards forms is adopted. As for the causes, they are represented by the force from which the meaning effects, which are four. The latent system differs from the visible system, meaning that the latent system takes place in which the following occurs: teleological, active, physical and imaginary.

The four causes (teleological, active, physical and imaginary) must be achieved in every external existence, and they represent the nature of the interconnectedness between the subjective represented by spiritual knowledge, and the objective represented by the mental knowledge, that is, the interconnection of a cause with an effect, since the teleological cause is the one that generates the engine that starts to represent the material, that is, it is the goal of the thing.

As for the active cause, it's the engine that begins in the representation of matter, and the physical cause isn't the substance in its physical sense, but rather the totality of the relationships used by the image, so the image represents or expresses the state of relationships for the causes that aforementioned.

As for the imaginary cause, it's the method of arranging the relationships in place to compose the thing, since the imaginary cause is related to the teleological cause, as the becoming must have a goal or a destiny that it becomes, even if it is implicit or hidden. Therefore, the teleological cause is always included in the imaginary cause, and the teleological cause gives limits to the thing, but these limits

don't mean the end of the thing, so the teleological cause isn't the end of the thing but the beginning of the action of the thing.

Conversation with the latent system is the teleological cause, and the corresponding visible system is related to the nature of the changes that occur to the student or to the concepts that the student builds. As for the active cause, it corresponds to the concepts and nature of the existing material that is latent in the qualitative material and this is physical in the external reality, which is a latent mental perception and the phenomenon is present in the external reality, the first is considered perceptions, and the second is authenticated because it's with the external physical reality. In the end, it can be said that the images that the person carries on the mental side are matched by the images on the visible side, and from this, the correlation relationship in the latent system is between (conversation - emotion - behaviour - recollecting), and thus the correspondence relations between spiritual knowledge and mental knowledge (Fig. 8).

The four causes interact with each other according to the correlation relationship, as the relationship is integrated, expressed in the image, which reflects the similarity in the method and the result with mental knowledge, beginning with the method of thinking related to a specific phenomenon, and that method will generate concepts related to the phenomenon, which are those concepts will deal with the materials, and those concepts will deal with the material to appear cases, in the phenomenon related with music, concepts deal with the musical score, so different forms appear in music, and in the phenomenon of architecture concepts deal with the data related to the phenomenon of architecture, such as if the shape is geometric to appear from the cases of interaction, cases that appear in forms and models expressing the methods of thinking and concepts.

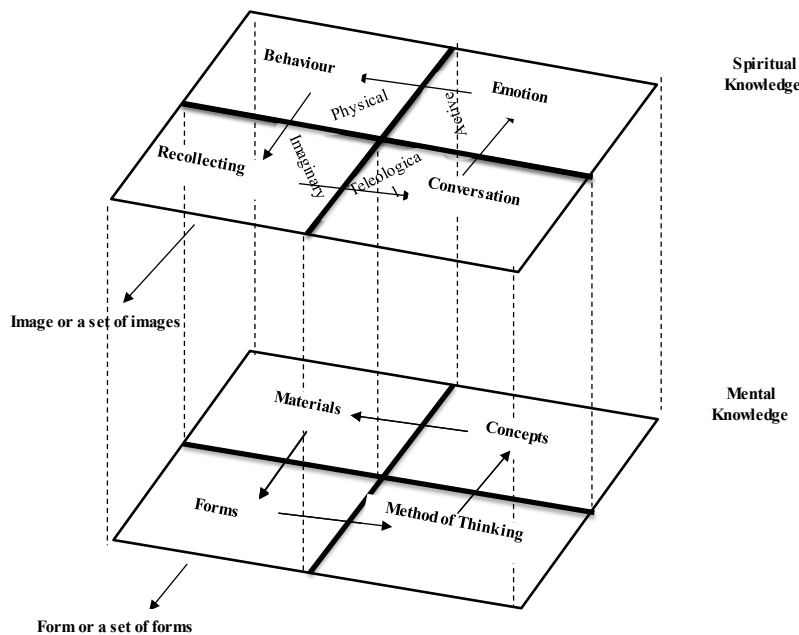


Fig. 8. the relationship of correspondence between spiritual knowledge and mental knowledge.

Considering that the conversation gave an emotion, as according to the theories of emotion, which emphasize that each architectural student has a motivation and trends concerned with identifying psychological needs and the reasons behind choosing to perform their products through images, without external interference, which is represented by the "self-determination theory", which is concerned with describing the behaviour of individuals to reach a specific behaviour by measuring the extent to which the performance of the behaviour is related to the internal motivation and their subjective - selection to perform it.

The behaviour theory relied on the nature of the emotion by emphasizing that changes in behaviour occur after presenting a specific environmental stimulus, so the result will thus lead to recollecting of a state of mental association to retrieve and perceive the previous thing, and that the nature of recollecting has been mentioned in the theories of knowledge sources that are considered to be the primary and basic in the way to use information to build new knowledge, meaning that the spiritual knowledge (memory and remembering) began from conversation and ended with recollecting (in the architectural product). This means that the stages of building the architectural product end from where the cognitive theories begin, and it ends with recollecting and from recollecting adopting a new knowledge of architecture or the recipient of the architecture.

Epistemology is concerned with thought and thought as a concept in epistemology means the movement of the mind between the imaginal unknown and the believable known to achieve perception. The forms produced in knowledge are potentialities resulting from the mind, the subjective represented by the goal and the result of the method of subjective thinking, the concepts and the resulting ideas, where these ideas work by moving the latent forces in the material, changing its pattern and here the correlation between the subjective and the objective appears.

6.2. The amount of displacement between mental knowledge and spiritual knowledge

The research relied on the amount of the displacement of spiritual knowledge from mental knowledge to find out the divergence of the variables from the centre to find out the trends that are directed towards spiritual knowledge or mental knowledge, and thus it is possible to classify any design activity as approaching or moving away from the centre of conformity, and the displacement ratio was determined as follows (close: 0 -5%, medium: 5-10%, far: 10% and more).

To find out the ratio of displacement between spiritual knowledge and mental knowledge at the macro level and at the level of the design process for architecture students by adopting excel and Auto CAD software and to indicate the amount of displacement of the centre for the results of spiritual knowledge and mental knowledge as follows:

i. Macro Level: The total results of spiritual knowledge and mental knowledge were shown as in Table 1, and by applying the displacement number of centres using the Auto CAD, the displacement ratio between them reached 0.59%, which is a result showing closer intense between spiritual knowledge and mental knowledge at the macro level.

ii. Project concept: the displacement ratio between the centre of spiritual knowledge and mental knowledge was 6.46%, which is the average percentage of the distance between them.

iii. Project activities: The displacement rate between the centre of spiritual knowledge and mental knowledge was 7.25%, which is a medium percentage distance between them.

iv. Project function: the displacement ratio between spiritual knowledge and mental knowledge was 9.36%, which is the medium distance between them.

v. Project needs: the displacement ratio between spiritual knowledge and mental knowledge was 9.46%, which is a medium percentage distance between them.

vi. Building the concept: The displacement ratio between spiritual knowledge and mental knowledge was 11.33%, which is a distant displacement ratio between them.

vii. Beneficiaries: The displacement rate between spiritual knowledge and mental knowledge was 3.82%, which is a result that shows the closer between spiritual knowledge and mental knowledge.

Figure 9 shows that the Macro level of spiritual knowledge and mental knowledge is very close to conformity because they depend on the four causes according to the spiritual and mental requirements. As for the variables related to mental knowledge, they are (project activities, building the concept) due to their connection with the objective aspect of the project and their dependence on the physical forms present in memory and their retrieval in the form of images and their representation in building the design concept and transforming it into an architectural formation, and the project activities are linked to all functions and linked to the architectural formation objectively. It shows that the variables related to spiritual knowledge are (project concept, project function, project needs) because of their association with thinking and understanding processes that depend on the student's subjective aspect of the student in choosing his / her graduation project. The beneficiaries of the project were equal between spiritual knowledge and mental knowledge and close to a match.

It can be said that the information engine is in the minimum by recollecting and includes three variables on the horizontal axis are (mental - sensory - extracting) and three variables in the vertical axis are (conversation - emotion - behaviour) (Fig. 10), where each variable was projection on the horizontal axis with the corresponding variables in the vertical axis, the idea of conversation as the highest value corresponds with the idea of extracting from the sources of epistemology, and also for behavioural theory, the viewpoint of emotion also includes a special point of view. As each one met with a specific activity, where the idea of extracting by conversation, the idea of emotion by sensory, and the idea of behaviour with the mind, which means that recollecting is the main focus on which the research works.

Where each vocabulary was placed on the horizontal axis with its corresponding variables in the vertical axis, the concept of conversation as the highest value corresponds to the concept of extracting with references to the theory of knowledge, as well as for the behavioural theory includes a point of view and emotion also a special point of view, as if each one met effectively, where formed The concept of extracting through conversation, the concept of emotional emotion, and the concept

of mental behavior, which means that recollecting is the main axis on which the research works.

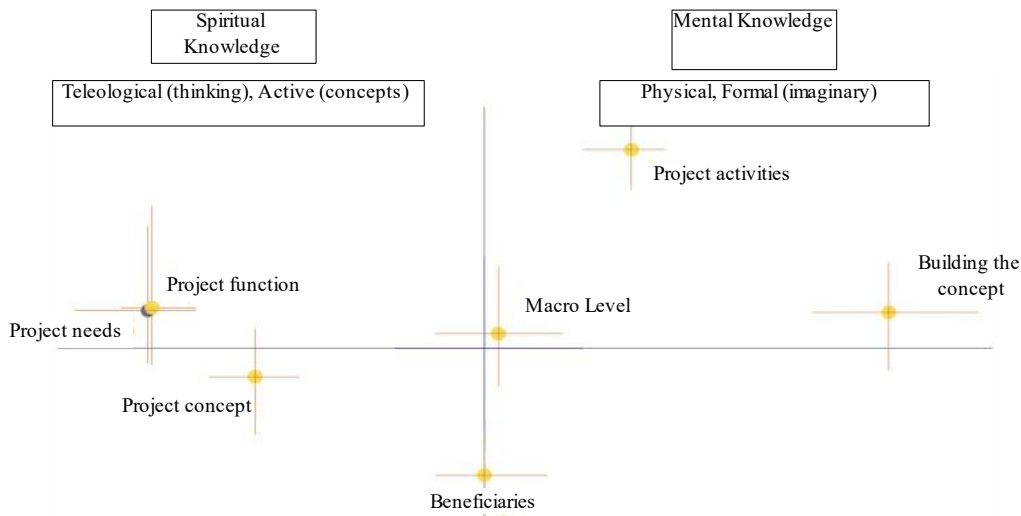


Fig. 9. The relationship of the research variables to spiritual knowledge and mental knowledge.

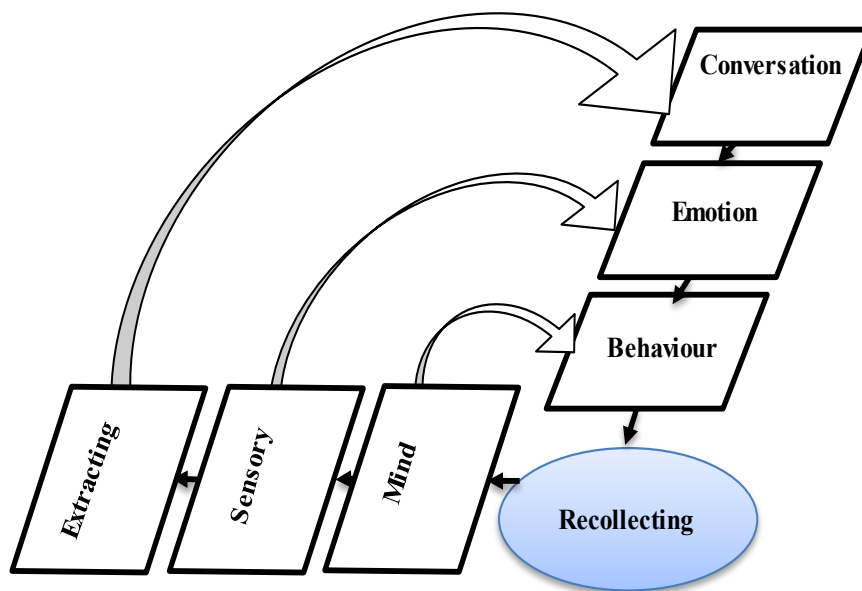


Fig. 10. The relationship between research variables and cognitive theories.

7. Conclusions

The findings of this research work are concluded as below:-

- Memory is an essential element in the educational process in general and in learning academic skills in particular. This is because we often rely on our

previous experiences in learning. Through the use of memory, the individual can deal with information, retain, store, remember or retrieve it, without integrating past experience with current experience, it will be difficult or impossible to learn different skills. Thus, the past is reconstructed according to the requirements of the present

- The importance of memory in communication and temporal and spatial continuity in recording and preserving information and transmitting it across generations to create personality and identity through cognitive processes as the centre of the learning and teaching process.
- The cognitive stages of memory are like a reflexive image that is formed for the subjects that are sensually experienced, it is closely related to the relationship of the subjective and the objective. The subjective represented by its goal is the result of the method of thinking, concepts and ideas resulting from the movement of forces latent in the material, changes its pattern and the correlation between the subjective and the objective.
- The nature of the artistic product varies according to the type of attention in the sensory and moral stimulus, which depends on the cognitive or selective context.
- The **teleological** and active causes are all the perceptual action that the student does, and the physical and **imaginary** causes are what represents the objective, and the subjective with its causes is the one from which the effect that represents the subjective comes from, and those causes are nothing but the rules of correlation between what the subjective carries and what it interacts with the objective.
- **Recollecting** is the core of the cognitive processes of memory, where the idea of **extracting** by conversation, the idea of emotion by sensory, and the idea of behaviour with the mind.
- The sequence of cognitive processes of memory for graduation projects appeared, starting with the variable of conversation, then emotion, behaviour, and finally recollecting.
- There is a very close correspondence between the centres of spiritual knowledge and mental knowledge because they depend entirely on the four causes.
- The project variables (project activities and building the concept) were related to mental knowledge, while project variables (project idea, project function, project needs) were related to spiritual knowledge.

8. Recommendations

The student must transfer new information to long-term memory and provide it in a way that can be integrated into the memory structure.

Long-term memory must be in contact with short-term memory and must be dynamic, for example, if the knowledge unit is imaginal rather than verbal, images will be easier and quickly stored in memory.

Paying attention to memory processes that begin with the presence of stimuli that work to process information in the form of sensory and semantic symbols for the purpose of preserving memory through repetition and correlation between information to retrieve and store it in long-term memory, which has a close relationship with the educational process.

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