

AI-Driven Teacher Preparation: A Constructivist and Cognitive Learning Perspective

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Abstract: This paper explores the preparation of teachers through the lens of modern educational and learning theories, with particular attention to how artificial intelligence (AI) can augment educational planning and professional teacher development. Three major theoretical frameworks are examined: (1) Constructivist Theory, rooted in Piaget's cognitive development model, emphasizing the learner's active role in knowledge construction; (2) Meaningful Learning Theory (Ausubel), which underscores the critical link between new knowledge and pre-existing cognitive structures; and (3) Information Organization and Processing Theory, which explains how memory encoding and retrieval affect learning outcomes. The paper further integrates the McCarthy 4MAT model of learning styles to illustrate how AI-driven, learner centred strategies can be operationalized in contemporary teacher preparation programmes. Findings suggest that effective teacher preparation must transcend content delivery and focus on equipping teachers with adaptive, student-centred methodologies grounded in cognitive science.

Keywords: Teacher preparation; Constructivist theory; Meaningful learning; Information processing; 4MAT model; Artificial intelligence in education; Learning styles; Cognitive theory.

I. INTRODUCTION

Teaching is widely regarded as one of the noble professions and a cornerstone of societal progress. The Holy Prophet (PBUH) affirmed this: 'The best among you are those who learn the Qur'an and teach it.' Education acquires special importance through the roles the teacher confronts teaching and educating, directing and guiding, transferring experiences, and contributing to the preparation of human beings to live with dignity in societies where security, peace, love, harmony, justice, and mercy prevail. The profession of a teacher is the mother of professions; there is hardly a profession that does not, directly or indirectly, trace back to a teacher. Old methods of education relied on personal, civil, or voluntary efforts, focused in their contents on the teaching of religion and language, and on craft professions in other tracks, until different countries adopted formal education and established institutions concerned with the teaching profession. This experience has gone through multiple stages, linked to the development of societies, until education and the quality of its products became a sign of the development and civilization of society. The teacher is considered the main pillar in the development of the educational process, contributing very effectively to the development of students' performance and directing them towards good citizenship. It deals with minds and ideas, refining and training them in all aspects of knowledge and technological progress. The success of any educational system depends primarily on the level of teacher preparation. The development of teacher training institutions has therefore become an important and urgent requirement to achieve comprehensive human development. The International Commission on Education for the Twenty first Century has emphasized the principle of equal educational opportunities and the need for continuous teacher training between the pre-service preparations and training phase [1]. With the rapid emergence of artificial intelligence (AI) in education, teacher preparation must now also encompass AI-driven pedagogical tools and data-informed instructional strategies. This paper investigates how modern learning theories provide a robust framework for re-envisioning teacher preparation in the AI age.

II. OBJECTIVES OF THE STUDY

This work paper aims to:

1. Demonstrate the concept of teacher preparation, old and new.
2. Present the concept of teacher preparation in the light of constructivist theory.
3. Derive the principles of constructivism in the preparation of the teacher.
4. Present the image of the teacher in the light of the constructivist theory versus the traditional classroom.
5. Discuss implications for AI-based educational planning within the above frameworks.

III. TRADITIONAL VS. CONTEMPORARY TEACHER PREPARATION

A. Traditional Concept

The following definitions characterize the traditional understanding of teacher preparation: Al-Aqili (2005) defined teacher preparation as the variety of knowledge, concepts, and experiences that an institution provides to a group of teachers with the intention of interaction with it in a way that modifies their learning and behaviour, achieving the educational objectives in a comprehensive and integrated manner [2]. Others described it as those plans that included all courses of study in a field or in certain educational fields and achieved the objectives of educational institutions, or as that organized pattern of cultural, academic, and professional experiences provided by faculties to students with the intention of preparing them for the teaching profession. Mohamed Ibrahim (2007) defined it as the sum of the various knowledge, skills, and emotional experiences provided by faculties through specialized and educational courses, general culture courses, and practical side activities, so as to enable teachers to carry out teaching in the stages of general education [3].

B. Contemporary Concept

Teacher preparation, in the contemporary sense, means that the educational institution provides a set of knowledge, skills, and educational experiences to student teachers or teachers during service, with the aim of interacting with these experiences in a way that acquires them knowledge and skills, works to modify their behavior, and achieves educational goals (Al-Shamiri, 2009) [4]. Qandil (2005) defined it as providing special courses to develop the necessary skills, information, and attitudes for the teacher, to help him perform his work tasks; divided into two parts: pre-service preparation and in-service preparation [5]. The teacher training programme is defined as 'a competency-based system, which determines the quality of competencies that the student-teacher should acquire, as well as the criteria that will be used to evaluate the extent to which the student acquires these competencies, and makes him responsible for the acquisition of these competencies' (Shouq and Said, 2001) [6].

IV. TEACHER Preparation in Light of Constructivist Theory

To achieve the desired educational goals, several modern theories have emerged in recent years, among which is the constructivist theory, from which the nature of teacher preparation is derived. Research conducted by psychologist Jean Piaget on the growth and development of knowledge in man laid the foundation for constructivist theory. Piaget developed an integrated and individual theory of the learner's cognitive development. This theory has two main parts: logical determinism and constructivism. The educational process from a constructivist perspective is a personal, contemplative, and transformative process in which ideas, experiences, and perspectives are integrated, and new knowledge and experiences grow (Sabri and Tawfik, 2017) [9]. The practical importance of constructivist theory lies in the fact that the learner himself builds knowledge and possesses solutions to problems so that this knowledge becomes an integral part of his own. Therefore, the preparation of the teacher in the light of this theory lies in training him to make the student the focus of educational science, to give him the confidence to build knowledge himself, and to develop his skills to solve the problems facing him.

A. Core Assumptions of Constructivism

The theory proceeds from the following assumptions (Huimel and Al-Anazi, 2015) [8]:

1. Knowledge is not an expression of reality but a representative expression of the learner's vision of reality; the activity of the knowing self is essential for the construction of knowledge. Some constructivist theorists have even considered learner activity and knowledge to be inseparable, in that knowledge processes are the learner's activity.
2. The criterion for judging knowledge among constructivists is not that it corresponds to the reality expressed by it, but that it is a human process that works to properly manage one's affairs and solve cognitive problems: knowledge is a tool for solving problems.
3. Knowledge does not exist independently of the knowing self but is linked to it and associated with it; therefore, no two educated people resemble each other in their knowledge of a particular thing.

B. Constructivist Principles in Teacher Preparation

In the light of the previous assumptions, the following principles of constructivism can be deduced in the preparation of the teacher (Sabri and Tawfik, 2017) [9]. These principles are illustrated in Figure 1.

Principle I – Linking Education to Students' Needs and Interests: This principle is related to the essence of knowledge building, where the new experience interacts with the cognitive construction of the learner. The student organizes his world in meaningful formations through which he perceives the world, carrying to school all his personal and educational previous experiences as an asset through which new experiences gain meaning. The first principle in constructivist teacher preparation is to train the teacher on how to present issues of interest to his students and be suited to their needs. Solving this problem requires the teacher to have the skills of flexibility and imagination so that he helps to reach the content and style that suits the needs of the present learner and that is a nucleus on which to build to help him in the future.

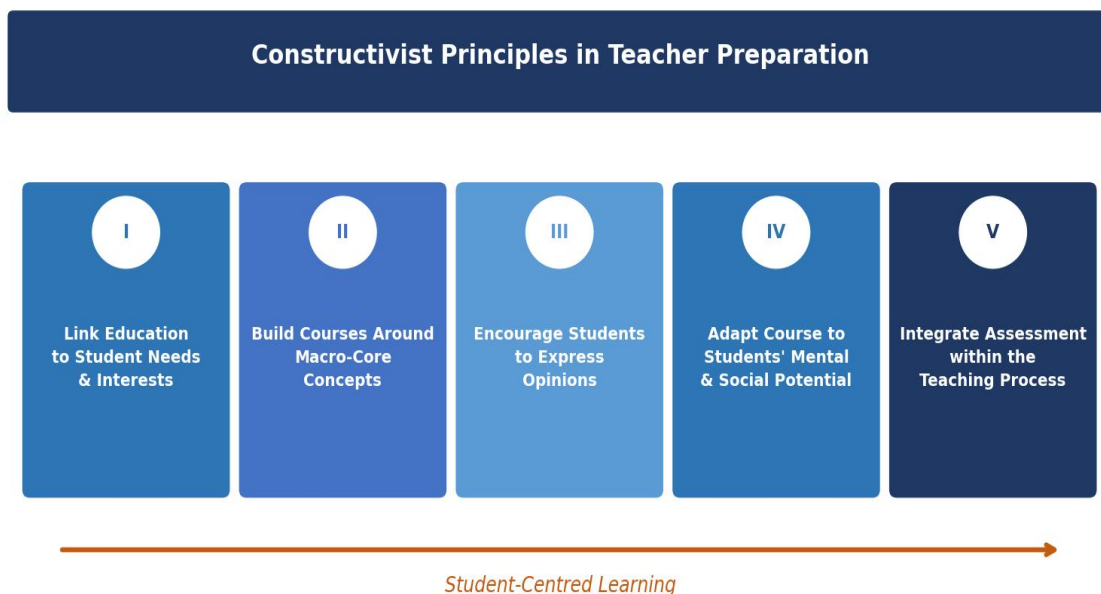


Fig.1 Five Core Constructivist Principles in Teacher Preparation (Sabri & Tawfik, 2017)

Teacher preparation programmers should include training in the design of learning tasks that allow the student to meditate, imagine, achieve multiplicity of visions, and test the credibility of what he learns.

Principle II – Building Courses around Macro-Core Concepts: When total concepts are presented, the learner reaches meaning from their analysis into parts. During this analysis, the learner realizes the relationship between the total concept and the molecules reached by analysis, creating a new construction and new understanding. When preparing for the teacher, he must be trained to distance himself from presenting separate parts—because the learner finds it difficult to perceive them completely—and instead focus on presenting concepts holistically so that the learner reaches meaning from their analysis into fragments (Ahmed Mahdi Abdul Halim, 2003).

Principle III – Encouraging Students to Express Their Opinions: Training the teacher to understand the student's vision of himself and his world is a fundamental principle in constructivist teacher preparation, where new experiences are inseparable from existing experiences. Constructivist learning employs this understanding in raising students' motivation to learn and in designing educational tasks. Without this understanding, the teacher transforms students into one block or template, in both his teaching and his expectations of their performance, which deprives many of them of opportunities for excellence and may expose many to the risks of learning difficulties. Students vary in their ability to fit into the same model imposed by the teacher.

Principle IV – Adapting the Course to the Mental, Emotional, and Social Potential of Students: Teaching and learning processes are activated when the requirements for success in the educational course are aligned with students' potential, meaning that there is a relationship between the requirements of the course and the experiences and preparations the student holds. This principle means training the teacher to take responsibility for adapting the course according to the needs of his students so that it addresses their experiences, trends, and expectations. If the teacher fails to achieve this principle, the course is emptied of its meaning for students and becomes a heavy burden (Ahmad Al-Mahdi Abdul Halim, 2003).

Principle V – Integrating Learning Measurement within the Teaching Process: Educational measurement is an essential element in the process of teaching and learning. However, when measurement comes only after the teacher and learner finish one or more educational units—merely to reassure that the student can provide correct answers—thinking declines and ready-made information becomes the supreme goal. This contradicts constructivism, which directs teaching and learning to modify and develop the cognitive structure of students by taking advantage of new educational experiences. Hence, the teacher must be trained in constructivist measurement to assess the extent to which the learner understands his world and is able to modify and reorganize previous experiences as a result of interaction with new experiences. The constructive measurement has a diagnostic function, identifying strengths and shortcomings in the learner's understanding and informing the teacher's planning. The structural measurement does not aim to classify or arrange students, but to deepen the understanding of their world (Ahmed Al-Mahdi Abdul Halim, 2003).

C. The Image of the Teacher in the Light of Constructivist Theory

The teacher in the traditional classroom is very different from the constructivist class. The following comparison (Sabri and Tawfik, 2017) [9] illustrates this difference, as summarized in Table I.

Table I – Comparison of Traditional and Constructivist Teacher Roles (Sabri & Tawfik, 2017)

Traditional Teacher	Constructivist Teacher
Presents course as separate parts, dispensing with basic skills	Presents the course as a holistic unit, emphasizing major concepts

Strictly adheres to the textbook	Interested in the questions of students; classroom activities draw on real-world environmental sources
Sees what he considers fit; seeks the right answer as proof of textbook mastery	Sees each student as an independent thinker with his own vision and construction of the world around him
Students work individually	Seeks the student's point of view to understand what was understood and uses this in planning following lessons

In the light of the above, it is clear that constructivist theory emphasizes the preparation of the teacher in a way that enables him to activate the active role of the student in learning, as well as the intellectual participation of the student, so that meaningful, understanding-based learning occurs.

V. Teacher Preparation in Light of Meaningful Learning Theory

This theory asserts that the most important factor in influencing teaching and learning is the clarity and organization of the learner's cognitive structure. The cognitive structure consists of a set of facts, concepts, issues, relationships, and theories available to the learner at some point. Ausubel sees that meaningful learning occurs when the learner connects new ideas and information to his cognitive structure. It is recognized that the teacher cannot always assume that the cognitive structure of students includes ideas that can be linked to new ideas or information; so Ausubel suggested the use of appropriate introductory materials or organizers at a high level of abstraction, generality, and comprehensiveness, used before submitting the educational material. Structured content is selected on the basis of its suitability to explain and integrate the educational material provided. Meaning is a meticulously differentiated emotional experience, clearly defined, that emerges in an individual when symbols, concepts, and issues relate to each other and are assimilated into their cognitive structure (Badriya Al-Mufaraj, 2007) [14]. Ausubel emphasizes that the most important factor in the teaching and learning process is the amount of awareness, clarity, and organization of what the learner knows before, in his cognitive structure, because he focuses on the exact sequence of educational experiences so that the unit being learned is clearly related to what precedes it. It is this correlation between the learner's current cognitive structure and the new material he will learn that makes the new material meaningful and moves away from memorization-based learning. Teacher preparation institutions must be aware of this subject to train the teacher before joining the service (Bayoumi Muhammad Al-Dahawi, 2000) [10].

A. Types of Meaningful Learning

Ausubel classifies the types of meaningful education into four basic categories hierarchically arranged from the lowest to the highest. The teacher must be trained to use and activate these with his students (Sabri and Tawfik, 2017) [9]:

1. Representative Learning: Appears in learning the meaning of separate symbols; one of the most important cognitive activities for the learner. These symbols first take the form of words spoken by parents to the child, indicating the things the child is paying attention to. The meanings the child gives to words become the visual or auditory image that the object provokes. With repeated association of the symbol with the object, the mere display of the symbol alone provokes the visual image of the object composing meaning. For example, a child sees an orange in early childhood, hears the word 'orange', associates the symbol with the image, and when he later reads the word 'orange', his mental image is associated with the written symbol.

2. Concept Learning: Distinguished by two stages. The first stage is concept formation the process of inductive discovery of properties simulated by the category of stimuli, integrated into a representative mental image of the concept developed from actual experience. The second stage is learning the meaning of the name of the concept, which is a kind of representative learning where the child learns that the spoken or written symbol is similar to the concept already acquired in the first stage.

3. Propositional Learning: In order for the learning of propositions to be meaning-based, the subject being taught must be linked to the learner's current ideas in his cognitive structure. Teacher preparation programmers must contain this principle.

4. Meaningful Receptive and Discovery Learning: Meaningful receptive learning involves the learner linking and integrating the information presented to him with his cognitive structure. Meaningful discovery learning involves the learner discovering the information partially or completely and then linking and integrating it into his cognitive structure. In his theory, Ausubel focused on learning being meaningful. This is achieved as new information enters the mind of the learner, that information which is relevant to his previous information stored in him; the new information is mixed and interacted with the previous to become part of his cognitive structure. Meaningful learning occurs only if the educational material is linked to the learner's previous educational background, consisting of relevant concepts, principles, and ideas that make the emergence of new meanings possible. This needs a teacher who has the skills that enable him to achieve this, so the teacher must be prepared accordingly (Bayoumi Muhammad Al-Dahawi, 2000) [10].

VI. TEACHER Preparation in Light of Information Organisation and Processing Theory

The theory of organizing and processing information is one of the modern cognitive theories; it represents a revolution in the field of memory study. The philosophy of this theory is based on the unity of memory and the association of its effectiveness with the level of organization and processing. This theory differs from old cognitive theories in that it was not limited to describing cognitive processes only but tried to explain the mechanism of occurrence of processes and their role in the processing of information and the production of behaviour. The theory is based on the following assumptions (Sabri and Tawfik, 2017) [9]:

1. The organization of information and its processing of the learned material leads to more continuous learning in the learner.
2. Information is organized and processed in steps represented by mental activities.
3. There are limits to the amount of information that a learner can process and learn.
4. The human processing system is an interactive system, not just receiving information.
5. Automatic repetition of information is not a condition for remembering it, in light of the lack of connection of the learned material with the cognitive structure of the learner.

The levels of organization and processing of information vary from surface to depth through an average level of processing. Figure 2 illustrates the complete memory model from sensory input through long-term storage.

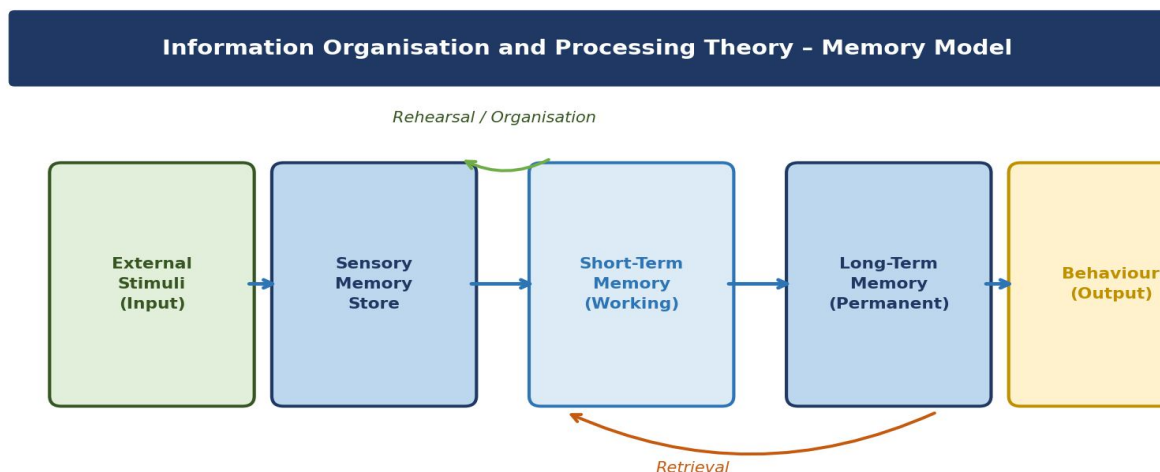


Fig. 2 Information Processing Memory Model (Abdelazim Sabri, 2010)

A. Levels of Processing

1. **Superficial or Marginal Level:** Information is processed at the sensory level or according to its formal characteristics only.
2. **Deep Level:** Information is processed according to what was known by the learner, and then a classification of that information is developed.
3. **Deeper Level:** Information is processed according to its meaning where the information is organized on the basis of semiotic i.e., meaningful processing.

The teacher who prepares for education must be aware of the above concepts, through preparation programmers that focus on the latest theories in teaching and learning. The process of teaching and learning can be explained according to the philosophy of this theory as follows:

The process of acquiring information and skills rises when the learner is able to pay attention, perceive, and search for the information he needs; the flow of that information to sensory recorders where the mind encodes it and converts it into short-term memory. Short-term memory is the active memory that preserves a small amount of information; if that information is repeated and the learner performs mental operations on that information like organization and retrieval they travel to long-term memory and thus information is stored and skills are acquired. Short-term memory differs from long-term memory in that the former stores events or experiences in the form of brief photographs to facilitate subsequent retrieval, linked to the individual's own experience. Long-term memory is responsible for retaining meaningful information such as words, symbols, and meaning-based relationships, forming the framework or cognitive organization of an individual and therefore varying from individual to individual. This theory attributes learning problems to a malfunction or disturbance in one of the processes, which may be due to the organization of the information provided to students. This negatively affects retrieval, classification, and processing. Some studies have recommended the need to propose strategies in light of this theory that organize information consistent with students' mental abilities and help them process and retrieve it.

B. Pedagogical Applications for Teacher Preparation

The following educational applications can be achieved by the theory of information organization and processing (Abdelazim Sabri, 2010) [11]:

1. Paying attention to visual or verbal inputs so that short-term memory is activated in students.
2. Focusing on the activity of students in absorbing new information in order to easily retrieve this information at any time later.
3. Organising information logically according to an organized series of mental steps and activities that lead to each other.
4. Re-repetition of information sequentially to ensure that it remains in the memory of students.
5. Attention to asking questions in all steps of organizing information, so as to make it easier for students to process them according to their mental nature.
6. Emphasizing the principle of integration and unity when preparing the scientific content provided, because students will organize and process information on the basis of common elements between them.

7. Focusing on providing students with different skills through continuous training in order to keep the impact of those skills in their long-term memory.
8. Attention to the organization of information on the basis of the formation of meaning more than memorization and remembering.
9. Emphasizing the attention of students and not distracting them from the steps that require them to process the information presented to them.

VII. TEACHER Preparation in Light of Learning Patterns: The McCarthy 4MAT Model

The quality standards of education advocated by global and national bodies such as the National Council for Accreditation of Teacher Education (NCATE) require consideration of individual differences in learners' patterns. Each learner has the right to better education and to learn according to the way he can learn. Learning style is a concept or term that refers to the appropriate response method of the individual to stimuli in learning contexts, and these responses to stimuli are behaviours that are the components of the individual learning pattern (Ahmed Abdel Rasheed, 2014) [12]. There have been many educational models associated with the teaching and learning patterns of learners. The 4MAT model is a training educational model that combines the basic principles of several theories based on the stages of human development as well as modern theories in the functions of the human brain. The theories of John Dewey, Carl Jung, and David Kolb formed the theoretical philosophy of the quadruple model of learning methods. These theories have assumed that the basis of human learning is a continuous individual adaptation resulting from the individual's construction of meanings in his life. The model also benefited from studies that dealt with the nature of the human brain and the application of this nature to teaching and learning situations. The application of the quadruple model of learning methods in teaching and teacher training is one of the successful projects in the United States of America and a number of foreign countries. Nineteen schools in the United States and Canada have benefited from its application in long-term educational projects, achieving impressive results, reflected in the academic achievement of male and female students and their attitudes towards teaching and learning. Figure 3 illustrates the complete 4MAT circular model showing all four learner types and their associated driving questions.

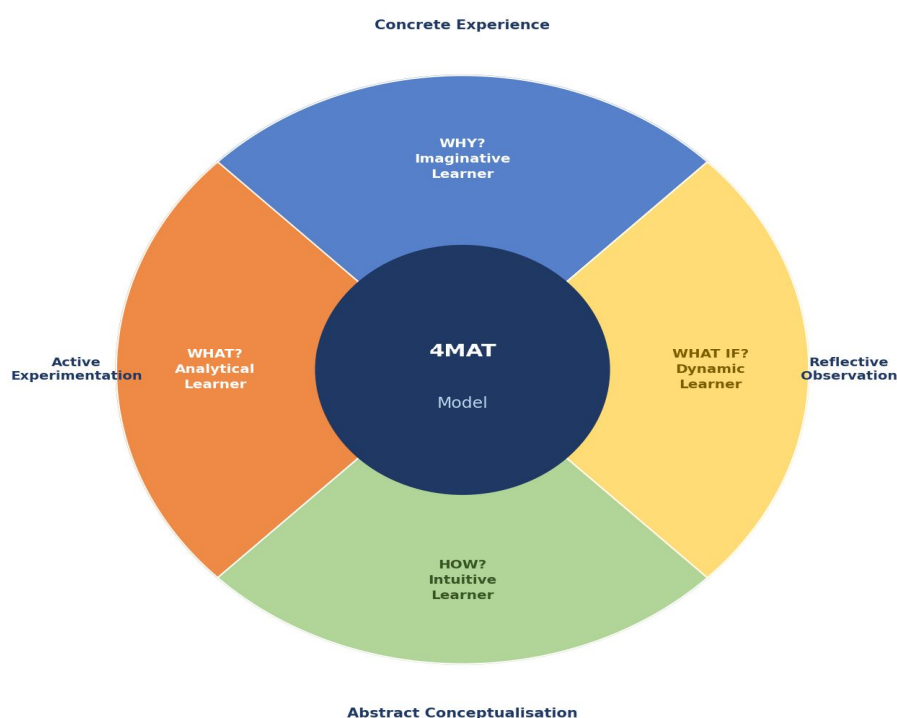


Fig. 3 McCarthy 4MAT Learning Style Model (McCarthy, adapted from Sabri & Tawfik, 2017)

A. Four Quarters of the 4MAT Model

The following is a description of the McCarthy 4MAT model, which contains four quarters of learning (Ibrahim Abdul Aziz Abdul Baqi, 2011):

1. **First Quarter (WHY?):** This quarter addresses learners who feel the importance of the content of the study in their lives, which generates a strong incentive for them to learn. It answers the learner's internal question 'Why?' and shows how important the content is to learners. In this quarter, the teacher should: motivate learners to the subject of learning and discuss with them the importance of this content in their lives.
2. **Second Quarter (WHAT?):** This quarter addresses learners who are interested in acquiring new knowledge and linking it to their previous experiences. It answers the learner's internal question 'What?' What will I learn?
3. **Third Quarter (HOW?):** This quarter addresses learners who are looking for practice and application of information gained from content. It answers the learner's internal question 'How?' how can I convert the acquired knowledge into an actual application?

4. **Fourth Quarter** (WHAT IF?): It addresses those learners who have ideas for the actual application of the information gained but in new contexts. It answers the inner question 'What if?' and requires the teacher to leave opportunities for learners to discover the meaning of knowledge by working on activities that answer this question, including oral or practical engagement with others.

B. Stages of the 4MAT Model

Research indicates that the 4MAT model consists of four stages according to the four learning styles. Each stage is divided into two sub-steps; therefore, the model includes eight steps, each of which fits a certain type of thinking skills, brain abilities, and other skills that must be available for learning to occur (Ibrahim Al-Zuhairi, 2007) [8]:

1. **Phase I** – Contemplative Observation: Learners have the opportunity to move from perceptible experiences to contemplative observation. The teacher should clarify the value of learning experiences and their personal importance and give learners enough time to discover the knowledge or meaning involved in these experiences. Lessons begin with the teacher finding the relationship between the learners and the knowledge they will learn. It is essential to create trust that allows each learner to personally share their opinions and have a dialogue with others, providing a scientific environment that allows learning and discovery to take place.
2. **Phase II** – Crystallization of the Concept: The learner moves to the crystallization and formation of the concept in the light of observations. Teaching at this stage depends on the traditional method. The teacher must provide learners with the necessary information, present information in an organized manner, and encourage learners to analyse data and form knowledge.
3. **Phase III** – Active Experimentation: Learning moves into manual experimentation—application and practice—to practice the experiences that have been learned and represent the practical face of knowledge. The role of the teacher is to provide the necessary tools and materials, and to give the opportunity for learners to practice work with their own hands so that they can answer the question of 'How?'
4. **Phase IV** – Tangible Material Experiences: The learner integrates new knowledge with his own experiences to bring about an expansion and development of knowledge. This is achieved for the learner through exploration and practical examination of experiences in new situations. The teacher should leave the opportunity for learners to discover the meaning of knowledge and concepts by working and doing activities that answer the question of 'What if?' This step is manifested in integration, celebration, and closure; the learner returns to where he started. The goal is to do things themselves and share what they have done with others. Learning is made available to a large number of pupils by sharing their writings and presenting their work, and the quality of the learner's final product is evaluated.

C. Four Learner Profiles in the 4MAT Model

Learners in the McCarthy model are divided according to the following patterns:

1. **Imaginative** Learner: A learner characterized by vast imagination who uses different senses to search for the direct meanings of the educational experience; always asks 'Why?' to learn about the values involved in any learning experience. Prefers to learn through listening, dialogue, and exchange of ideas.
2. **Analytical** Learner: A learner who perceives information in an abstract way and processes it through meditation; also integrates previous experiences with the topics studied. The clear feature in his question is 'What?'; he searches for synthesis and creativity activities and confronts his problems with logic and analysis.
3. **Intuitive** Learner: A learner who always seeks practical practice of theoretical experience; always asks the question 'How?' in order to actively process information and employ what he has learned in his working life.
4. **Dynamic (Active)** Learner: A learner who has learned learning experiences by intuition; asks 'What if?' and extends knowledge to novel contexts.

VIII. ARTIFICIAL INTELLIGENCE IN EDUCATIONAL PLANNING

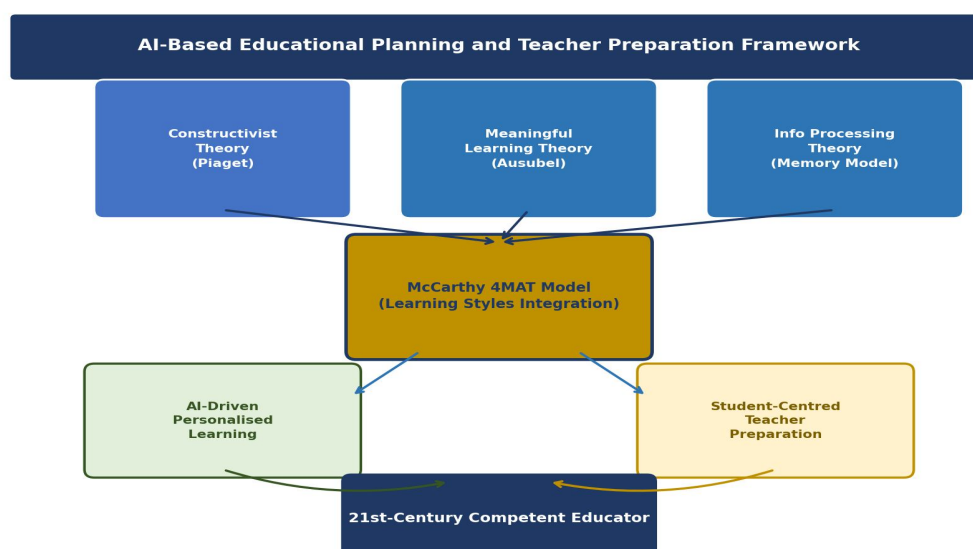


Fig. 4 Proposed AI-Based Teacher Preparation Framework

AI-based educational planning can operationalize the theoretical frameworks discussed above through adaptive learning systems, intelligent tutoring, and data-driven personalization. Figure 4 presents the proposed integrated framework showing how AI links all three theories through the 4MAT model toward the outcome of a twenty-first-century competent educator. When aligned with constructivist principles, AI can dynamically tailor tasks to individual student knowledge structures. When aligned with Ausubelian theory, AI can generate advance organizers and automatically map prior knowledge. In the context of the 4MAT model, AI-driven platforms can profile learner styles and assign pedagogically appropriate content and activities accordingly. Teacher preparation in the AI era must therefore extend beyond theoretical knowledge to include digital literacy, familiarity with learning analytics, and the capacity to collaborate with intelligent systems in diagnosing and meeting the diverse needs of learners.

IX. DISCUSSION

The importance of the 4MAT model in learning, according to a review of several related studies, can be summarized as follows:

1. It helps students to learn and understand content and promotes successful communication, one of the primary objectives of this model.
2. It provides a more successful and efficient learning environment. It motivates learners, raises mental abilities and thinking about what they are learning, and makes them better able to analyse the situations they are exposed to.
3. It effectively works on learning processes, increases confidence and motivation, improves performance and growth, and raises the level of self-esteem and harmony.
4. It activates the pillars of the learning process—content, learning techniques, teaching strategies, and evaluation methods, taking into account social relations and linking experience to the environment through content design.
5. It helps teachers 'pay attention to several aspects such as why the learner learns, not only what he learns, and taking into account learning preferences. This helps the mind to adapt and expand during application and practice.
6. It takes into account the employment of both sides of the brain through alternating between the right and left side; the learner learns information in two ways, namely perception and processing. Ahmed Abdel Rasheed (2014) found that applying learning-pattern models in geography instruction significantly enhanced mental perception skills and geographical understanding among secondary students [12].

X. CONCLUSION

It is clear from the presentation of previous theories that the preparation of the teacher for the practice of teaching and learning must stem from a theory through which the teacher can prepare a student who can keep pace with contemporary scientific and local variables. Therefore, it has become necessary to reconsider the roles of the teacher and the learner; many theories have called for the transfer of attention from the teacher to the learner and for making the learner the determinant of the educational process.

Previous theories have emphasized that learning must be:

1. Related to the student's life, reality, needs, and interests.
2. Occurring through the interaction of the student and his communication with his peers, parents, and members of his community.
3. Based on the student's abilities, the speed of his growth, and the rhythm of his learning.
4. Really putting the student in the 'center' of the educational process.
5. Occurring in all places where the learner is active school, home, laboratory, library, and activity rooms.

In light of the above, it has become a necessity for the contemporary teacher to be prepared in a way that keeps pace with the modern view of learning through the use of student-centered teaching strategies that suit his abilities, interests, learning styles, the intelligences he enjoys, as well as the appropriate activities and appropriate measurement tools, and other elements of contemporary teacher preparation. This paper has demonstrated that teacher preparation must be grounded in robust theoretical frameworks that situate the learner at the center of the educational process. The Constructivist, Meaningful Learning, and Information Processing theories alongside the McCarthy 4MAT model collectively underscore the necessity of preparing teachers who can activate student agency, connect instruction to prior knowledge, process information meaningfully, and respond to diverse learning styles.

AI-augmented teacher preparation must extend beyond theoretical knowledge to include digital literacy, familiarity with learning analytics, and the capacity to collaborate with intelligent systems. Recalibrating teacher training towards these dimensions is not merely desirable, it is an imperative for educational systems aspiring to meet the demands of the twenty-first century.

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