A Mechanism for Designing and Producing an Expert Interactive Educational System According to Artificial Intelligence Technology for Specialized Art Education Materials (Perspective as a Model)

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Abstract

The current research aimed to identify: the mechanism of designing and producing an expert interactive educational system according to artificial intelligence technology for specialized art education materials (perspective as a model).

On which the expert educational system is based in accordance with the foundations and criteria for accrediting the educational platforms approved by the Iraqi Ministry of Higher Education and Scientific Research in e-learning and in accordance with the learners' previous experiences in using these platforms and defining the general and educational goals of the educational system and the educational environment and the characteristics and needs of the target group.

The researchers identified the theoretical and logical starting points on which the expert educational system is based. They also determined the criteria for designing the expert educational system for perspective and its design stages by adopting the Mohammed (2015) educational design model for the design of smart and expert educational systems, mainly in the design of the expert educational system, and ending with its evaluation stage, and its application.

The results of the study concluded that the scientific foundations and standards used in the design and production of expert educational systems should be adopted, starting with analyzing the characteristics of students, identifying their educational needs and activating their positive role in the learning process, through the steps of implementing and evaluating the system, and ending with achieving effective educational results. In the light of the results of the research, the researchers recommended:

•   The need to open training courses for teachers to design and use artificial intelligence techniques represented by smart and expert educational systems.

•   Focusing on the learner when designing electronic educational materials, as it is the focus of the educational process and its purpose is to provide an integrated experience that is consistent with his expertise and learning capabilities.

Keywords: *interactive educational system, artificial intelligence, specialized technical education materials.*

INTRODUCTION

Societies have sought to raise the level of their institutions in general, and education in particular, by relying on the best methods and modern methods in order to advance them and reach the maximum levels of being able to achieve their goals affected by the developments of modern digital technologies, which have become one of the most important features of this era.

Therefore, Iraqi universities began to think about new educational systems that would enable them to reach the optimal use of their capabilities, with the aim of catching up with the developed world in the field of education, It focused on developing its outputs from learners in line with the requirements of the current era and keeping pace with scientific development, through its adoption of e-learning.

In line with recent trends in the development of educational systems through its programs and scientific content provided within its curricula, and the researcher was keen to advance the scientific and skill level of students and to enhance education and upgrade it. According to artificial intelligence technology to develop students' skills in perspective

Here, the researcher defined the research problem in the following question:

(What is the mechanism for designing and producing an expert interactive educational system according to artificial intelligence technology for specialized art education materials (perspective as a model))?

research importance

• Expert systems are a path out of traditional patterns of learning to flexible interactive patterns. The scarcity of studies and research that used artificial intelligence techniques and expert systems in the field of arts in general and art education in particular, which makes it the first study in this field, according to the knowledge of the researchers.

• The importance of the current study lies in the importance of the topic it addressed by opening new horizons for those interested and researchers, especially graduate students, of the importance of artificial intelligence techniques in the teaching and learning process and achieving its goals, especially in the field of art education.

• The importance of the current study is not limited to identifying only the applications of artificial intelligence in education, but its role extends to the mechanism and methods of its design and application requirements that can be used in education in general, especially with the orientation of the necessity of applying artificial intelligence techniques in the educational process.

Search target:

The current research aims to identify: the mechanism of designing and producing an expert interactive educational system according to artificial intelligence technology in perspective through its design procedures.

search limits:

• Temporal limits: the academic year 2022-2023.

• Spatial boundaries: Department of Art Education / College of Fine Arts / University of Diyala.

• Objective Boundaries: A mechanism for designing and producing an expert interactive educational system according to artificial intelligence technology for specialized art education materials (perspective as a model).

Define terms:

Artificial intelligence: Maker (2006) defined it as "AL abbreviated as a term given to one of the latest computer sciences, and belongs to the modern generation of computer generations. Decisions are made in a logical and orderly manner, in the same way that the human mind thinks. (Maker, 2006, p.39)

Expert system: Al-Dasouki (2015) defined it as "software that can simulate the behavior of a human expert or a group of experts in solving problems or making a decision in one of the branches of specialized knowledge, which provides support for those with less experience to benefit from a greater balance of experience by interacting directly with the system."
(Al-Dasouki, 2015: 244)

Theoretical and procedural definition of the expert interactive educational system for perspective subject:

In the light of each of the definitions of the terms of the variables of the study of the current research and the methodological procedures for it, the researchers defined the mechanism of designing the expert interactive educational system as follows:

The researcher defined it theoretically as:

The methodological stages of designing a computerized educational system characterized by the process of educational interaction designed to simulate the mental operations of the expert teacher and try to act as an expert specialized in the subject matter of perspective.

The researcher defined it procedurally as:

"The mechanism and stages of producing an expert educational system prepared with artificial intelligence techniques is planned and designed in an interactive style through organized and integrated educational units prepared with (graphic) technology, which is similar to the mentality of a specialized expert teacher. It aims to develop students' skills in applying and mastering the basic rules of perspective subject."

Artificial Intelligent:

In its broad scope, intelligence refers to all mental processes such as ingenuity, innovation, and control of movement, senses, and emotions. As for the scope of studying the science of artificial intelligence for computers, intelligence refers to the scope of a person's ability to visualize things, analyze their properties, and draw conclusions from them. Thus, it represents the ability of a person to develop a model My mind to a field of life and identify its elements and extract the relationships between them, and then create reactions that are commensurate with the events and situations of this field, which confirms that the faculty of intelligence can be accurately described to the extent that the machine can simulate it. (Ismail, 2017: 37)

This concept emerged as a result of linking or merging two elements to work together: (intelligence), which is the ability to think, understand, and deduce, which are the characteristics of the human mind, and (artificial) which is the ability to make computers made by humans to carry out the tasks of thinking, understanding, and deduction.
(Othman, 2012: 11)

Therefore, Sadiq (2016) referred to artificial intelligence as that science that allows computer programs to perform their work according to intelligent behavior, an ambition that simulates intelligent human behavior. (Sadiq, 2016, p. 17)

It is meant by artificial intelligence as one of the most important computer sciences, which looks at how to make the computer perform the work that humans do in a better and faster

way, and also works to design smart systems that have the same characteristics as human intelligence, and it also processes non-algorithmic symbols in order to reach a solution various problem. (Zayed, 2005: 149)

Smart and expert educational systems:

One of the most prominent aspects of technical progress is the use of artificial intelligence applications in the educational process, which contributed significantly to the development of educational systems, as its use in learning has become a necessity because of its important advantages in raising the level of the learner's knowledge and skill outcome, in addition to employing the element of excitement and suspense for the educational process Its use also changed the appearance of the educational system with its various components, which helped the emergence of new educational patterns, the most important of which are smart and expert educational systems that sought to achieve effective learning.

Muhammad (2016) stresses the need to develop the educational and educational systems in light of the modern developments to distinguish the current era with rapid and successive developments, so it needs a person who is able to adapt his circumstances and needs to these changes and developments, so education in general and education in particular is responsible for developing human minds that are capable on the development of community paper,

And finding solutions to many problems that threaten the individual and society, and since the goals of education in the contemporary time have increased and multiplied, therefore, many old and modern attempts have appeared on the use of smart systems that are experts in education and the design of electronic educational situations that aim to make

education more distinctive. (Muhammad, 2016: 4)

We believe that the educational system based on some strategies (technologies) of artificial intelligence can help stimulate, improve and develop innovative thinking, due to its good educational presentations and diversity in the methods of presenting the educational material, and opportunities for participation, dialogue, discovery and simulation. The system is characterized by intelligence and interaction with the user. It provides an interactive and simple environment at the same time. (Shehata, 2005: 7)

Education systems and programs based on artificial intelligence are systems or environments that uniqueize the educational process based on various educational variables, such as the sequence of tasks, their level of difficulty, time, the type of feedback, the pace of learning, the reinforcement plan, and others. Smart learning environments are able to change themselves and their shape for what the learner offers. Data and what that data concludes from previous knowledge about the learner and how he learns, which makes it able to achieve the best results. (Al-Mallah, 2017: 106)

Expert Learning System:

Computer expert systems are one of the most important fields and applications of artificial intelligence and the fastest spread and use in all fields, including the field of education in particular, which aims to simulate the human expert in thought and style by provoking new ideas that lead to innovation and mastery in learning, as its emergence and launch dates back to the seventies of the last century As soon as these systems appeared, they became the focus of attention of all institutions, including educational ones.

Expert systems derive their name from the fact that they are computer-based smart systems using artificial intelligence. They are

considered systems that have combined computer-assisted teaching, artificial intelligence, communication techniques and knowledge transfer. It is limited and with different degrees of difficulty according to the learning ability.

It is also able to simulate the learner's style in the features related to supporting learners in acquiring knowledge, i.e. able to solve problems, logical interpretation and learning, and was designed to facilitate constructive learning.   (Ismail, 2015: 357)

She indicates that they are computer programs that simulate the human thinking processes of human experts in solving problems in specialized fields, or they are systems for programming the knowledge of one or more human experts in a specific field in an attempt to simulate their way of thinking, by relying on the computer to provide that knowledge.
(Al-Banna, 2007: 5)

Expert systems belong to what is known as knowledge-based systems, which represent a new addition to systems based on computers, as they came as a result of many researches in those areas, then increased interest in them and became one of the most important and widespread scientific fields at the present time, and the expert system behaves according to a method that simulates the behavior of Humans through the development of computer programs that can analyze events and situations in a specific field and reach the same conclusions or results that the expert reaches.

Accordingly, they are systems that work to solve complex problems in the way that an expert person solves, and to provide advice and interpretation as provided by an expert person in his field of work.
(Sadiq, 2016, p. 16)

Previous studies:

The researchers conducted a comprehensive field survey of all studies and literature in the field of specialization (art education) to find out the previous studies that dealt with the subject of the study or the research variable (expert educational systems) in all arts disciplines to benefit from them. No local, Arab or foreign study was found that dealt with the subject of the current study. The level of the faculties of fine arts, however, they found some studies that dealt with expert systems in other disciplines far from the arts, so the researcher satisfied himself with this reference.

Research methodology and procedures:

First: research methodology:

The researchers used the descriptive analytical approach to achieve the goal of the research, which included a mechanism for designing and producing an expert interactive educational system according to artificial intelligence technology for specialized art education materials (perspective as a model).

Second: Research procedures:

The foundations and principles upon which the expert educational system is based:

☐   Designing the expert educational system according to the foundations and criteria for accrediting the educational platforms approved by the Iraqi Ministry of Higher Education and Scientific Research in e-learning and in accordance with the learners' previous experiences in using these platforms.

☐   Determining the general and educational goals of the educational system, the educational environment, and the characteristics and needs of the target group.

☐   Determine the elements used in the design of the expert educational system by defining the educational programming patterns

adopted in the expert educational system, the method of integration and interaction of the elements among themselves, and the educational and enrichment units that represent the educational content of the perspective subject.

□   Determining the degree to which the students of the second stage of art education departments in the faculties of fine arts can apply the rules of perspective and master them.

□   Adopting feedback through the characteristics of the expert educational system, which allows the learner to re-present the educational content more than once and in a different way according to his desires and abilities in learning, in order to reach the maximum degree of mastery.

□   Achieving the principle of interaction between the learner and the expert educational system through the ability of the expert educational system to direct scientific questions to the learner, as well as the ability of the system to answer any question by the learner related to the perspective subject.

□   Adopting self-evaluation of the student's progress and the stages of formative and final assessment as a basis for achieving the goals and verifying the development of students' skills.

□   Making the student the focus of the educational process, as the components of the expert educational system were designed in the form of interactive educational units, which provides students with the opportunity to actively participate in the use of the educational system and achieve the desired goals.

□   Giving the teacher an essential and important role in managing the learning process through the multiple characteristics of the expert educational system.

□   Adopting Mohammed (2015) educational design model for the design of smart and expert educational systems, mainly in the design of the expert educational system.

The theoretical and logical premises on which the expert educational system is based:

o   Designing an expert educational system in accordance with the logical organization of the educational content of the subject that helps the learner to move effectively in achieving the goals set for learning.

o   Designing an expert educational system according to the capabilities, desires and capabilities of the learner, which makes the learning process more effective in achieving the specific goals in developing their skills.

o   The diversity of educational units and activities and the integration of the elements included in the expert educational system makes the learning process interesting and attractive to the learner.

o   Continuous evaluation of the learner by the expert educational system contributes to reaching the maximum degree of mastery in the development of the learner's skills.

o   Providing immediate feedback by the expert educational system helps learners increase their motivation towards learning.

o   Reliance on modern learning theories as a theoretical basis in designing the expert educational system, which has proven effective in e-learning, represented by learning theory in the digital age (communication theory).

Expert expert advice:

The researchers directed an open questionnaire to those with expertise and specialization in the field of curricula, teaching methods and educational techniques as well as specialists in

the field of artificial intelligence techniques to benefit from their views on the adoption of expert educational systems in teaching the subject of perspective, as well as taking their educational and scientific directions in this regard, and in the light of analyzing their opinions, the researchers summarized Valuable methodological and scientific steps to design an expert learning system in perspective subject in line with the requirements and needs of the target group and the current educational situation.

Determine the general objectives of the interactive educational system:

The two researchers defined the general objectives of the system in a procedural manner and formulated them in clear behavioral terms, all of which fall under the main objective of the system, where the objectives of the system consisted of (22) goals.

Determine the criteria for designing the expert educational system for perspective subject:

In the light of the researchers' review of the literature and previous studies in the field of designing expert and smart educational systems, which include in their procedures defining standards for their design and preparation, the researchers extracted several criteria that they considered the basis for designing the expert educational system.

☐ The expert educational system should be designed in the light of the specific educational objectives with the intended learning outcomes for the perspective subject.

☐ Achieving linguistic and scientific accuracy in designing the educational content, read and audio, for the expert educational system.

☐ The content of the expert educational system should be designed from pictures, graphics and video clips prepared with (graphic) technology in a way that is characterized by aesthetics and simplicity, and to be clear and interesting in line with the nature of the subject and the potentials and abilities of the learners.

☐ The expert educational system, in its design, should achieve a good level of interactivity that enables the learner to actively and effectively participate in learning activities.

☐ The expert educational system achieves feedback for learners by designing the content of its components of scientific material, educational and enrichment activities, and evaluation methods in accordance with the goal of the expert educational system.

☐ The system should achieve a high level of quality in its functions by achieving the greatest possible benefit for the learners in developing their skills and mastering them.

☐ The design of the expert educational system should be economical and easy to use in order to achieve the ability and efficiency of the learner to control and navigate between its components.

☐ To be designed according to modern software that enables the learner to use it through a computer or mobile device.

Stages of designing the expert educational system for perspective subject:

The construction of any educational system must follow a specific model for educational design, and by extrapolating and analyzing the different models of electronic educational design for educational programs and systems in general, and smart and expert systems in particular. smart and experienced, and it was approved according to the following justifications:

☐   It is one of the modern models in the design of smart and expert educational systems.

☐   The quality standards of this model start from the study and analysis stage and end with the evaluation.

☐   This model is distinguished by the existence of two important and independent stages in the design: (the educational and instructional design stage - the technical design stage).

☐   The model combines all the advantages of the different electronic design models and avoids the defects that may occur in them.

☐   Verifying the effectiveness of the model in developing learners' skills.

☐   Direct communication by the researchers and the model designer.

First: The first stage is the stage of study and analysis

1-   Analyzing the problem and assessing the needs of the learners: An open survey questionnaire was presented to a sample of the drum of the second stage to identify their needs for this subject and their proposals to develop it from their point of view.

2-   Analysis of educational tasks: The analysis of tasks here refers to the process of determining the main tasks and sub-tasks that must be performed in an elaborate manner. Therefore, the researcher, in the light of analyzing the problem and assessing the needs of the learners, designed the educational unit for the subject of the standard scale within the expert educational system using the method of procedural analysis of the tasks in order to accurately determine the steps. sequence that the learner must perform.

3-   Analysis of the characteristics of the learners and their entrance behavior: The students of the second stage / the Department of Art Education / the faculties of fine arts / the morning study were identified as a target group for designing the expert educational system, being a group between the ages of (19-24), which is characterized by the increase in the breadth of experience that students acquire in dealing with situations and in In light of the findings of the researchers in terms of analyzing these characteristics, the researchers concluded that artificial intelligence techniques should be adopted for them through the expert educational system.

4-   Determining the educational content of the perspective subject: The two researchers looked at the vocabulary of the perspective subject adopted within the curricula of the Ministerial Art Education Department for the second stage in the colleges of fine arts in Iraq and approved by experts and specialists to teach that subject, which the researchers adopted as educational content for the expert educational system.

5-   Description of the learning environment: The learning environment used in the expert educational system is characterized as an individual learning environment, which requires that the learning time be one of the variable rather than fixed factors. He is independent according to his abilities and speed of learning and is responsible for achieving the specific educational goals. This does not mean dispensing with the role of the teacher and excluding him from the educational situation. Rather, his role remains more important in managing the educational process according to the characteristics and advantages enjoyed by the expert educational system.

Second: Design Instructions:

1-   Determining the educational objectives: In the light of the educational content of the subject, the educational objectives of the educational units were determined, which amounted to (12)

objectives. They were presented to a group of experts in the field of specialization to indicate their suitability and representation of the educational content.

2-   Formulation of behavioral goals: The behavioral goals were derived in light of the content of the material and the educational goals of the standard scale according to Bloom's levels for the cognitive domain, which numbered (83) goals, and (Simpson) classification for the skill domain, which numbered (165) behavioral goals distributed over all The levels have been defined in a clear procedural manner, taking into account scientific standards in their formulation, and to ensure the accuracy of the objectives and their derivation according to their fields, they were presented to a group of specialists and experts and asked to estimate their validity and representation of the levels of the two classifications.

3-   Determining and formulating the educational content: The educational content of the expert system of the Perspective subject was identified and approved in advance in the analysis stage.

4-   Determining the learning strategies used: Educational strategies have been used that increase interaction and confirm learning among learners, including the strategy of electronic practical presentations, which allows learners to view what has been presented of skill performance through multimedia, and then the practical application of that skill.

5-   Design of tribal measurement tools: The researchers prepared the tools of the current research, which are two tools:

☐   Cognitive test of objective questions.

☐   The skill test represented by the completion of four main requirements (drawing) that are evaluated through the skill performance grading form.

Third: Technical Design:

Knowledge analysis of the domain (content) and its representation: Knowledge was analyzed for the educational content of the Standard Scale subject and classified into two main types:

☐   Declarative knowledge: It represents a description of the basic and sub-concepts of the educational content of Perspective and the relationships between them, as well as its basic rules. This knowledge was represented by the semantic networks method.

☐   Procedural knowledge: It represents the rules and employment of the use of basic and sub-concepts of the educational content and the different paths to display and learn those concepts and rules during the educational system. This knowledge was represented by the decision tree method.

☐   Interface design of the system: The researchers designed the interaction interfaces of the educational system on paper, taking into account the simplicity and ease of movement between the interfaces of the sub-interfaces of the educational units through the navigation keys, as well as achieving a general balance in the distribution of the educational and introductory units within the main interface.

Fourth: Production:

Architectural design of the educational system:

1-   Choosing the operating system: The researchers used the CANVAS STUDENT platform, which is a website based on education and the design of educational platforms supported by teachers. Through an educational application on a device.

2-   Designing and building the expert or field model (knowledge base): This model contains integrated knowledge of the basic rules about the subject that the student is required to learn and master, which are

included (educational unit - enrichment activities - tests - final evaluation). Errors, as well as a source for generating explanations and responding to learners' questions represented by the question-solving unit.

3- Designing and building the student model: It was used to determine the student's knowledge state in the educational subject provided by the system as well as store and represent that knowledge of the student so that the model can make the necessary inferences and make educational decisions with the aim of aligning the learning included in the system with the student's individual needs.

4- Designing and building a teaching or explanation model: It is also called the teacher model. In the current study, this model is responsible for managing and providing explanations to learners about the standard scale subject, by using all the data stored on the subject in the knowledge base, which the researchers prepared and designed in the educational unit.

5- Designing and controlling the educational interactions interfaces: The two researchers designed and produced the main and secondary interaction interfaces and what they contain of texts and graphics.

6- Selection of production tools and programs: Several programs were used in design and production, namely. (Microsoft Word) and Adobe Audition (for audio production and Adobe Photoshop) for design, (Adobe After Effects) for producing and designing digital visual effects, montage program (Adobe Premiere Pro) and Flex Clip) for video editing and 3D programs.

7- system programming: In this step, the actual production of the expert system was based on what was previously produced from the components of the educational system, and it was programmed in the light of the following procedures:

☐ The system provides direct synchronous education and asynchronous education through virtual educational units on the Internet.

☐ Programming the interaction interfaces of the interactive educational units within the educational system with two characteristics. The first is to provide the interactive educational unit by dividing the educational unit into sequential sub-units. The second feature is to present the interactive educational unit in an integrated and connected manner, provided that the two characteristics work with the same characteristics and advantages by containing the audio recording Simultaneous with the presentation of the written text, accompanied by educational animated pictures and pictures, as well as the educational video of the educational unit prepared according to the (graphic) technology.

☐ Programming the system to include homework, self-tests, and spaces for dialogue, participation, and interaction.

☐ Programming the system with features that make the teacher a vital element in managing the learning process, monitoring learners' access to the system, organizing electronic tests, and the communication process through messages, chatting, and electronic dialogue for learners.

☐ Controlling the timing of the self-tests by the teacher by informing the learners of the instructions and dates of the tests on their e-mail, and this also applies to the final exam.

☐ Programming the system with the advantage of providing a special file (final report) that contains all the data of each learner and the extent of his progress in the educational system and the total score he obtained and its percentage, as well as the time spent learning each learning unit and the time it takes to answer the tests (self-final).

☐ System Coding: The system has been programmed to work through the barcode (QR).

Fifth: Evaluation stage:

1- The initial application of the system: It was applied to a random, exploratory sample of (10) students from outside the original sample who had not previously studied the standard scale subject from students of the Department of Art Education / second stage / College of Fine Arts / University of Diyala / for the academic year 2022-2023 morning study, On Thursday, 10/8/2021., in the interactive hall of the college by entering the website of the expert educational system on the Internet or through the application for mobile devices.

2- Monitoring learners: Students' performance and progress were monitored while studying the content of the expert educational system through their use of all its educational components and follow-up on the level of their progress in studying and learning the educational content, as well as responding to their inquiries firsthand.

3- Maintenance and technical support: In light of the observations made by the students through their application of the expert educational system in its initial form and the difficulties they encountered while entering the system, the most important difficulties that the researchers touched through these observations were identified, and he made all the appropriate modifications and then re-used the system again By the students to ensure the clarity of its steps, and the students unanimously agreed on the clarity of the steps of the system and the ease of their dealing with it, and thus the expert educational system for the standard scale subject is ready to be applied and used in the main experiment.

4- Structural evaluation of the initial version: After completing the procedures for applying the expert educational system in its initial form, the researchers decided that the structural evaluation of the system should be by conducting a special referendum with the aim of evaluating the expert educational system for the subject of the standard scale directed to the exploratory sample, which the researchers applied to them in its initial form to ensure the ability of the system and its ability to achieve the desired goals.

5- The final output of the system: After completing the procedures for the initial application of the system, analyzing the referendum data for its evaluation, making all the necessary adjustments for that, and presenting it to experts and specialists in (art education, teaching methods, educational technology, and computer science), the effectiveness of the expert educational system was verified for what it was designed for, and thus it became ready to be applied and used in the main experiment

6- The final application of the system: After designing and producing the expert educational system in its final form, it was field applied to the research sample (the experimental group) on Tuesday corresponding to (10/18/2022) and continued until Tuesday corresponding to (12/13/2022).

Conclusions:

• The educational system was based on the scientific foundations and standards used in designing and producing expert educational systems, starting with analyzing students' characteristics, identifying their educational needs and activating their positive role in the learning process, through the steps of implementing and evaluating the system, and ending with achieving effective educational results.

• The expert educational system, when designing and producing it, takes into account the levels, capabilities and tendencies of students by dividing the educational content into educational units according to a logical

sequence and in an organized, sequential and gradual manner in order to make it easier for the student to absorb them.

• Organizing the educational content within the system, saturating it with audio-visual stimuli, and linking the cognitive aspect with the skillful one, which enabled the students to understand and assimilate the cognitive aspects and develop their skillful aspects.

• The diversity of learning methods in the expert educational system, as well as the educational units designed according to (graphic) technology, which include educational videos, pictures, and explanatory texts synchronized with voice commentary, led to the involvement of more than one sense of the student, which increases the student's ability to absorb and understand the material, and accelerate learning process.

Recommendations:

☐ The need to open training courses for teachers to design and use artificial intelligence techniques represented by smart and expert educational systems.

☐ Focusing on the learner when designing electronic educational materials, as it is the focus of the educational process and its purpose is to provide an integrated experience that is consistent with his expertise and learning capabilities.

Proposals:

Complementing the current research, the researchers propose a similar study to design expert educational systems in applied or other practical specialized study subjects.

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