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The Effectiveness of an Artificial IntelligenceBased Learning Environment in Developing Academic Achievement, Decision-Making Skills and Attitude towards Technology Among the Female Students of the College of Education at King Khalid University Considering of Kolb's Model

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Abstract

The current study aimed to identify the effectiveness and impact of a learning environment based on artificial intelligence in the light of the Kolb model in developing achievement and in developing decision-making skills and the trend towards technology among female students of the College of Education at King Khalid University.

To achieve the objectives of the research, the quasi-experimental approach was applied using two groups, one of them was a control group consisting of (30) students and the other was an experimental group consisting of (32) students, with the use of achievement test tools, decision-making scale, and technology orientation scale.

The results resulted in the presence of a statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who studied in the learning environment based on artificial intelligence in the light of the Kolb model and the scores of the control group students who studied in the traditional way in each of the achievement test, decision-making skills and direction towards technology.

The results also revealed a statistically significant difference for the level of influence of the independent variable, the learning environment based on artificial intelligence, in the light of Kolb's model, on each of the dependent variables on cognitive achievement, decision-making, and attitude toward technology.

Keywords: Artificial intelligence in education - Kolb Model- decision-making skills - attitude towards technology.

فاعلية بيئة تعلم قائمة على الذكاء الاصطناعي في تنمية التحصيل ومهارات اتخاذ القرار والاتجاه نحو التكنولوجيا لدى طالبات كلية التربية بجامعة الملك

خالد في ضوء نموذج كولب

إعداد

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الملخص

هدفت الدراسة الحالية إلى التعرف على فاعلية وأثر بيئة تعلم قائمة على الذكاء الاصطناعي في ضوء نموذج كولب في تنمية التحصيل وفي تنمية مهارات اتخاذ القرار والاتجاه نحو التكنولوجيا لدى طالبات كلية التربية جامعة الملك خالد.

ولتحقيق أهداف البحث تم تطبيق المنهج شبه التجريبي باستخدام مجموعتين إحداهما ضابطة تكونت من (٣٠) طالبة والأخرى تجريبية تكونت من (٣٢) طالبة مع استخدام أدوات الاختبار التحصيلي ومقياس اتخاذ القرار ومقياس التوجه نحو التكنولوجيا.

وأُسفرت النتائج على وجود فرق ذو دلالة إحصائية عند مستوى دلالة (٠.٠٥) بين متوسطي درجات طالبات المجموعة التجريبية الذين درسوا في بيئة التعلم القائمة على الذكاء الاصطناعي في ضوء نموذج كولب ودرجات طالبات المجموعة الضابطة الذين درسوا بالطريقة التقليدية في كل من الاختبار التحصيلي ومهارات اتخاذ القرار والاتجاه نحو التكنولوجيا.

كما أسفرت النتائج على وجود فرق ذو دلالة إحصائية لمستوى تأثير المتغير المستقل بيئة التعلم القائمة على الذكاء الاصطناعي في ضوء نموذج كولب على كل من المتغيرات التابعة التحصيل المعرفي واتخاذ القرار والاتجاه نحو التكنولوجيا.

الكلمات المفتاحية: الذكاء الاصطناعي في التعليم - نموذج كولب - مهارات اتخاذ القرار - الاتجاه نحو التكنولوجيا.

Introduction

In light of the information explosion and the steady technological and cognitive development, the education sector has witnessed remarkable developments in recent years, in line with the technological advances in the modern world. Searching the Internet has become an integral part of the learning processes. The tablets have replaced books in many educational institutions. However, all these developments, which surprised the world in the recent past, may lose its luster with the occurrence of what is expected from the inclusion of artificial intelligence into the education sector, which is already emerging, promising unprecedented transformations in this sector, so that the techniques, software, methods and applications of artificial intelligence to create learning methods provides an opportunity for learners to think and be independent, as they learn new knowledge based on their past experience and their desire to learn more in appropriate ways.

Artificial intelligence has spread widely in many different fields, due to the highly developed technology it offers, which mainly contributes in one way or another to the development of any new field it enters. AI applications have evolved in several areas, most notably education. Class sizes grow much faster than the budgets of educational institutions, and this can limit individual interaction between students and teachers. Until recently, this sector lacked the required development, leading both startups and companies with many years in the industry to find educational solutions based on the use of artificial intelligence to interact with students and learn how they excel and when they need improvement (Wahid, 2018).

The method of learning is the personal method used by the individual in dealing with information during the learning process, and through which he reacts and responds to the stimuli presented thereto, as well as it is based on the behavioral, cognitive and physiological traits of the individual (Al-Rayes, 2008: 175).

Multiple learning styles are varied and knowing them helps the teacher improve his teaching practices and choose the appropriate strategies for his/her students (Jaafour, Turzult, 2013): 199).

According to Kolb Model, all learning styles should be integrated into the ideal learning process. David Kolb presented his model to be

based on his educational theory, an experimental and educational theory based on experiment-based learning and the importance of activity during learning between the learner and the environment. It also shows that intelligence is the result of an interaction between the learner and the environment.

Learning styles are a combination of preferred individual styles. This theory emphasizes that learning is a process whereby knowledge is formed through experience and knowledge outcomes. It is a combination of absorbing and applying experience. Learning thus is a process, not just a result, and it is a continuous and inclusive process based on experience (Jaradat, 2011).

Decision-making is a desirable pedagogical goal of the educational system, and such a system is required to prepare learners who are able to choose the best alternatives from among the proposed alternatives within certain limits and with relative independence from others (Te'ma, 2010).

Al-Asadi (2011) stressed the importance of decision-making and that it has to do with problem solving and creativity in education. This requires an individual's use of many thinking skills, and that the more mental and cognitive ability the more ability to have decision-making.

From the above, it has been clear the importance of using modern learning styles and building strategies based on artificial intelligence because of its importance in the lives of learners in the situations and problems that require them to study according to their learning styles and to judge and make the appropriate decision according to their experiences, whether in their daily or study lives, individually or collectively, which will increase their attitude towards technology in ways that increase their self-confidence and enable them to reach innovative, creative and quick solutions at the same time.

The problem and questions of the study

The problem of the current study stemmed from:

1- The personal observation of the researcher during teaching the 'Computer in Education' curriculum for the female students of the third level at the College of Education of King Khalid University, as the researcher noted the need for the female students to obtain cognitive competencies to use computers in education. The researcher also noted they need innovative teaching methods that increase their positive

attitude towards technology and help them develop their decision-making skills.

2- A variety of insights and studies on artificial intelligence as a modern method to assist in the teaching process. The study of Bradford & Wyatt (2010), De Boer (2013) and Rhema & Miliszewska (2014) emphasized the importance of using technological developments, especially artificial intelligence, in education. They also explained the positive impact it has, and the extent to which this positive attitude towards technology is related to the level of skills possessed by the learner in the use of technology. As Aknasha (2015) found a set of technological tools that can be used by lecturers to promote learning. These tools help to achieve communication between the learner and the teacher, as well as the interaction of the learner with his/her colleagues as well as interaction with the content provided, which makes learning more interesting and interactive and being meaningful and motivating for students.

3- There have been many conferences that have recommended using robot and artificial intelligence in education, and spreading the culture of e-learning, including: The 15th Scientific Conference of the Egyptian Society for Educational Technology (2015), the 4th International Conference of E-Learning and Distance Learning (1436), the 3rd International Conference of E-Learning (2016), 5th Arab Conference of Robotics and Artificial Intelligence (2017) and the First International Scientific Conference of Digital Education (2018).

This led the researcher to think about building a strategy based on artificial intelligence in light of Kolb Model, and study its effectiveness in the academic achievement and development of decision-making skills and the attitude towards technology among university students.

The problem of the study can be identified in the following question: What is the effectiveness of a strategy based on artificial intelligence in developing academic achievement, decision-making skills and the attitude towards technology among the female students at the college of education of King Khalid university?

This main question is divided into the following questions:

- 1- Is there a statistically significant difference between the average scores of the experimental group and the control group in the post-achievement test in favor of the experimental group?

- 2- Is there a statistically significant difference between the average scores of the experimental group and the control group in post-decision making skills test in favor of the experimental group?
- 3- Is there a statistically significant difference between the average scores of the experimental group and the control group in the post-attitude towards technology test in favor of the experimental group?
- 4- Is there an effect of the independent variable (AI strategy) in light of Kolb Model on (decision-making skills, academic achievement, and the attitude towards technology among the female students of the college of Education of King Khalid University?

Study Hypotheses:

The present study is based on the following hypotheses:

- 1- There was no statistically significant difference at the significance level (0.05) between the average scores of the female students of the experimental group who have studied the strategy of artificial intelligence and the scores of the female students of the control group who have studied in the traditional method in the academic achievement test.
- 2- There was no statistically significant difference at the significance level (0.05) between the average scores of the female students of the experimental group who have studied the strategy of artificial intelligence and the scores of the female students of the control group who have studied in the traditional method in the decision-making test.
- 3- There was no statistically significant difference at the significance level (0.05) between the average scores of the female students of the experimental group who have studied the strategy of artificial intelligence and the scores of the female students of the control group who have studied in the traditional method in the attitude towards technology test.
- 4- There is no effect of the independent variable (AI strategy) in light of Kolb Model on (decision-making skills, academic achievement, and attitude towards technology among the female students of the college of Education of King Khalid University.

Study Objectives:

This study aims to identify:

- 1- The effectiveness of a learning environment based on artificial intelligence in light of Kolb Model in the development of academic achievement of the female students of the College of Education.
- 2- The effectiveness of a learning environment based on artificial intelligence in light of Kolb Model in the development of academic achievement and decision-making skills of female students of the College of Education.
- 3- The effectiveness of a learning environment based on artificial intelligence in light of Kolb Model in developing attitude towards technology among the female students of the College of Education.
- 4- The impact of a learning environment based on artificial intelligence in light of Kolb Model on (decision-making skills, academic achievement, and attitude towards technology among the female students of the college of Education of King Khalid University.

Study Importance:

The importance of this study is due to:

- 1- Contribution to the enrichment of scientific research through a research that tries to develop decision-making skills and attitude towards technology in university education.
- 2- Building an education strategy based on artificial intelligence in light of Kolb Model in developing attitude towards technology among the female students of the College of Education.
- 3- Drawing the attention of educational staffs and educational designers to the production of electronic environments based on artificial intelligence to teach university students and help them develop several skills.
- 4- Preparing the measure of attitude towards technology to suit the educational environment in Saudi Arabia and verifying validity and reliability

Study limitations

The present study adheres to the following limitations:

- Scientific limitations: The present research is limited to the computer curriculum in education and deals with the concepts and skills thereof.
- Human limitations: The application of the current research is limited to undergraduate female students in the Department of Psychology, third grade.
- Spatial limitations: College of Education for Girls - King Khalid University

Study Terminology:

Artificial Intelligence

Barrett (2008) states that the term artificial intelligence means machine simulation of human intelligence. Thagard states that artificial intelligence is “the branch of computer science that is about finding computers that have the ability to accomplish intelligent tasks,” referred thereto in (Al-Sayyid, 2014: 246).

Ma & Siau (2018) defines it as the ability and development of IT-based computer systems or other devices to complete the tasks that typically require human intelligence and logical elicitation.

Marvin Lee Misky (2005) defines it as the computer software that engages in the tasks that are fulfilled to the satisfaction of humans and that requires high-level mental processes such as cognitive learning, memory organization, and logical thinking.

The researcher defines it procedurally as a set of levels programmed in a smart way to accommodate cognitive processes and simulate the action of human beings and represent their performance so that students achieve the principle of self-learning.

Decision Making Skills

Abu-Hajjaj (2010) defines the decision-making process as "the process or method of rational choice between alternatives available to achieve a particular goal". Radwan (2012: 39) defines it as a complex process that aims at the conscious choice between the alternatives

available in the post-study of the consequences of each alternative, and test its effects on the objectives to be achieved.

Decision-making skills are defined by Al-Mutairi (2017) as the student's skills in identifying, organizing, analyzing and evaluating the problem in light of certain criteria, then selecting the best alternatives to solve the problem.

The researcher defines decision-making skills procedurally as the ability of the student to analyze the situation and evaluate the problem, and to find several alternatives to resolve, and then adopt the most appropriate alternatives and show the justifications for that.

Attitude towards technology

Badawi (2008: 15) defines the attitude towards technology as "the general feeling and relatively consistent among students in terms of acceptance or rejection of technological innovations, as well as the attitude towards their importance in scientific and practical terms, so that this feeling is directed to students in order to know their support or opposition ."

The researcher defines it procedurally as the extent of acceptance of the third-grade students of the Department of Psychology to use artificial intelligence and the extent of their knowledge of its importance and confidence in the positive results of learning in an environment based on it.

Kolb Model

Al-Kinani and Al-Kandari(2005) defined it as a model of interpretation of the learning process, which is based on the foundations of the experimental learning theory. It is based on two dimensions: Information perception, which begins with sensory experience and ends with abstract concepts. Information processing, which starts with the contemplative observation and ends with effective experimentation, and the learner is more effective if he/she recognizes those dimensions and the capacities they contain.

Literature review

1- Artificial Intelligence in education

Artificial intelligence application in learning is still subject of academic research for over thirty years. It teaches learning wherever it happens in traditional classrooms or in the workplace, in order to support formal learning and lifelong learning. Artificial intelligence systems utilize multiple specialties and learning sciences (psychology, Neurolinguistics, sociology and Anthropology) to promote the development of adaptive learning environments and other flexible, comprehensive, personalized, engaging and effective Artificial intelligence tools.

Both (Mousa and Bilal, 2019) indicate that the use of AI in learning systems is still very limited although it can significantly develop learning process by meeting the needs of individual learners, connecting students to each other, providing access to digital materials and supporting decentralized learning tools.

The study by (Najjar, 2012) deals with the effectiveness of the use of smart programs to develop the skills of building Web sites for the students of the Information Technology Division in the light of the overall quality standards, where it is intended to study the smart programs that work to develop the skills of building websites, which are pointed out in:

- Artificial intelligence technology and educational programs.
- skills of building websites

The study by (Al-Saud, 2017) aimed at introducing the concept of artificial intelligence, its origin and emergence, the difference between it and human intelligence, in addition to its fields, approaches, features and the importance of artificial intelligence in general, and in education in particular, especially its role in the development of teaching strategies and models. With focusing on the applications of artificial intelligence in curricula and teaching social studies. In addition to the technical applications that serve artificial intelligence and the challenges facing its features. Accompanied by a presentation of previous studies on artificial intelligence with commentary, and proposed studies in the field of social studies.

The problem of studying (Azmi, Ismail, and Mubariz) revolved about. 2014) In the absence of some skills to deal with the problems of maintenance and programming of computer networks and overcome the problems faced by learners, which affects in one way or another on their practical performance, so this study seeks to test an e-learning environment based on artificial intelligence to solve the problems of maintenance of computer networks. The results of the study indicated that there is a statistically significant difference between the experimental group before and after in the post measurement for both achievement test and observation card. This difference was in favor of the experimental group. This demonstrates the effectiveness of using the electronic learning environment based on artificial intelligence in increasing the achievement of concepts in solving computer network maintenance problems among students of the Educational Technology Division at the Faculty of Specific Education.

Lutfi (2018) has demonstrated that artificial intelligence techniques have recently been used to get the best approach to learning. It is possible to provide an educational system that allocates instruction to each student based on his abilities and skills, in addition to helping the teacher to determine the level of students and increase their rate of success. There are programs that help correct answers and grading, saving teacher's time and effort. Computer can also be utilized in the fields of education through programs that interact with the user, there are also programs that make the computer like a human being susceptible to learning by making the program benefit from multiple data entry and then infer the general approach to users.

There are many applications that rely on Artificial intelligence systems in learning, including data tracking and data mining techniques to track student behavior and collect data on attendance in the classroom to provide appropriate support to avoid dropouts.

Artificial intelligence systems in learning can use the results of data analysis to determine the speed at which students answer questions and then determine whether a student has answered knowledge or guesswork, and Artificial intelligence compares students' responses from the same classroom to a particular question. Artificial Intelligence to interact with parents, students and teachers to alert them to some educational or behavioral problems.

Artificial intelligence techniques are also used to identify gaps in knowledge and recommend any subject that the student should then study based on his or her abilities.

The TrueShelf platform was created by a Princeton faculty staff member who relied on an artificial intelligence engine that could create unlimited mathematical questions. These questions are analyzed by their artificial intelligence engine and a decision is made on the student's strengths and weaknesses (Moses, Bilal. (2019: 304

The following are examples of intelligence teaching and intelligent content of artificial intelligence applications in the learning environment:

Intelligent Tutoring Systems (Intelligent Tutoring Systems) (ITS) are computer systems designed to support and improve Tutoring and teaching in the field of knowledge. it provides real-time lessons without the need for intervention from a human teacher. ITS aims to facilitate meaningful and effective learning using a variety of computing technologies and Artificial intelligence. (Wikipedia contributors, September 8, 2019).

As defined by Katie Hafner, intelligence Tutoring is a system of Tutoring programs that contain the element of artificial intelligence, as, The system tracks students' work and guides them as needed by collecting information on the performance of each individual student. It can also highlight the strengths and weaknesses of each learner and provide the necessary support in a timely manner; one such system is the CIRCSIM-Tutor (Lutfi, 2019).

Intelligent teaching systems use a number of machine Tutoring techniques and self-learning algorithms that collect and analyze large data sets. This combination allows the systems to decide what type of content should be delivered to the learners according to their abilities and needs. For example:

Site Mica¹ provides teaching tools based on artificial intelligence, especially for busy university students and provide each student with their own learning process.

Content Technologies, Inc. specializes in CTI² making educational books based on artificial intelligence techniques. Teachers Download curriculum outlines to the CTI engine that uses artificial

¹ Mica: <http://www.mica-project.eu>

² CTI: <http://contenttechnologiesinc.com/>

intelligence algorithms to create content appropriate to the subject and specific to a particular student or group of students (Micawy, 2018).

Kurshan, 2016 (Chaudhry, 2013) states that Artificial Intelligence can play a role in learning analytics, assessing the quality of curriculum materials and adaptive learning, There is also the possibility of using artificial intelligence to create unique learning paths for individual learners in open group lessons and co-educational online.

The potential of artificial intelligence to make significant contributions in any field is immense and education should not be left behind (Kurshan, 2016).

2- Kolb Model

The learning method expresses the student's most preferred way of organizing his / her cognitive activity in its various dimensions. In addition, it is concerned with the form - this activity without content - and the manner in which the individual deals with the problems he is exposed to in the surrounding world. It is also influenced and influenced in the method of teaching, which is known as the interaction between readiness and processing, and where learners differ in the way of information processing, and this is known as the method of learning that requires different methods to provide learning materials, learning content, and its organization (Trzult, Et al. 2013).

Whereas Kolb's educational theory is an experimental educational theory presented by scientist David Kolb in his book "Experiential Learning: Experience is the source of learning and development "issued in 1984, which provides a model of practical application based on the following areas: Building learning on the basis of experience and the importance of activity during learning. It also shows that intelligence is the result of interaction between the learner and the environment. According to Kolb's style, all patterns should be integrated into the ideal learning process. Individuals may try to use all methods and yet tend to develop strengths in one way to absorb the experience and another to transform it. Learning styles are a combination of individual preferences, and this theory emphasizes that learning is a process whereby knowledge is formed through experience and knowledge outcomes. It is a combination of absorbing and applying experience and that learning is a process, not just a result, and learning is a continuous and inclusive process based on experience (Jaradat, 2011).

Whereas (AbuZayd, 2011) noted that Kolb's theory of learning is based on two horizontal (verb) and vertical (knowledge) areas, the ends of the horizontal axis indicate the dimension of the task, the left end indicates the initiation of the action, and the right end indicates its observation, while the ends of the vertical axis indicate To a physical and theoretical dimension, where the upper end of the axis refers to sense and sense, while the lower end refers to thought.

These four ends on the two axes explain four ways to address the learning process:

- Concrete experience
- reflective observation
- Abstract conceptualization
- Active experimentation

The following figure shows the learning styles for the Kolb Model

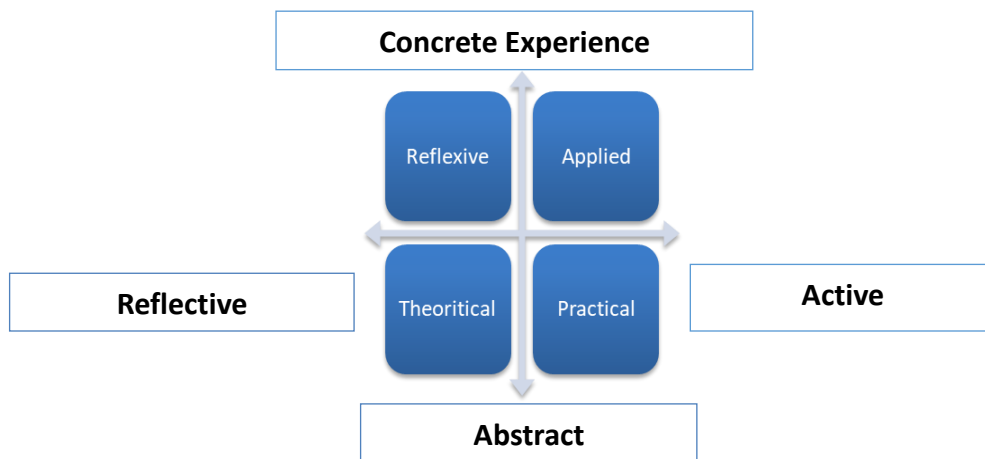


Figure no.1

The Kolb's learning style for learning styles and learners

The Concrete experience that represented in:

- Knowledge of information is greatly created through the solid experience or the outstanding reality recognized by sense and feeling, so they find theoretical course is useless in the learning process.
- The learn best from examples and living evidences, especially which those of lived experiences.

- They often have tendency to their counterparts (a person, who has sensitivity to personal feelings not conspirator).
- The theoretical knowledge isn't often helpful but the effectiveness is more for the counterparts' comments and teamwork in learning.
- The planned activities should apply learned skills.
- Such type of trainees is an independent person and self-directed. The trainer acting as the trainee is a guide or cooperator for him/her.

reflective observation which represented in:

- Their recognition depending greatly on notice and out observation, so they greatly use the careful observation before judgment.
- They prefer the learning environment that allow the objective control.
- They tend to be introverts. Less interactivity in the groups activities. (It may interact with small groups)
- Such type of trainees needs trainer to be reflector for experience and experiments.
- They look for the experienced and coaching trainer.
- They interest in comparing their performance without criteria.

Abstract conceptualization that represented in:

- Their recognition depending greatly on analytic conceptual perspective depending greatly on the logical thinking and the rational evaluation
- They almost directed to things and symbols rather than other people.
- The more targeting and controllable of learning conditions and asserting on theory and analysis, the better they learn.
- If the learning conditions are random and relying on discovery learning, they go at board.
- The case studies, theoretical knowledge, and mentality exercises are suitable for that type of trainees and the others may have considered less useful for them.

Active experimentation that represented in:

- Their recognition depending greatly on the direct experiment through practice and action.
- They learn better when they are demanded to conduct an activity, homework, or discussion groups.
- They refuse the negative learning, such as lectures.
- They tend to be open minded as such learner wants to touch everything or much touching.
- Problem solving, small discussion groups, feedback through the counterpart, and self-directed tasks are suitable learning methods.
- That trainee like to touch and see everything by self and decide the private standards.

Two axes crossed to form four quarters the represented in the learning styles:

- Reflectional: (Concrete experience + reflective observation)
- Theoretical: (Abstract conceptualization+ reflective observation)
- Practical: (Abstract conceptualization+ active experimentation) needs to practical concepts then executing work
- Executive: Or work execution (Concrete experience+ active experimentation) and after executing work, the experiences drawn.

It is noted that the Kolb's learning style has not received the attention it deserves. One of studies that conduct search on is the study of (Ahmad, 2004) which aimed to recognize the effectiveness of Kolb's learning style (when applied on some grammatical structures). That most important result that there are no affirmed learning style achieving good education in the grammatical structures and there is an improvement in using the Kolb's learning style.

In addition to the study of (Nasr, 2009) that discussing the effectiveness of learning by experiences according to Kolb's learning style developing planning skills in teaching mathematics in terms of combination between comprehensive assessment and active learning, the study results refer to appropriate learning by experiences according to Kolb's learning style for the students nature in terms of aging group and motivation for learning

In the field of educational technology and smart learning, the study of (Tsoi,2009) applied Kolb's learning style for improving the blended learning in educating sciences to provide an alternative practice style in education in order to supporting blended learning experiences in teaching sciences.

The study of (Abu Zayd 2011) aimed to recognize the impact of Kolb theory on the achievement levels and attitudes towards learning biology for the students of first grade secondary. The study results showed that using Kolb learning style has an impact on changing the student's attitudes, students tend to teaching using styles, and the diverging and assimilating styles are superior to Converging and Accommodating styles on the achievement levels.

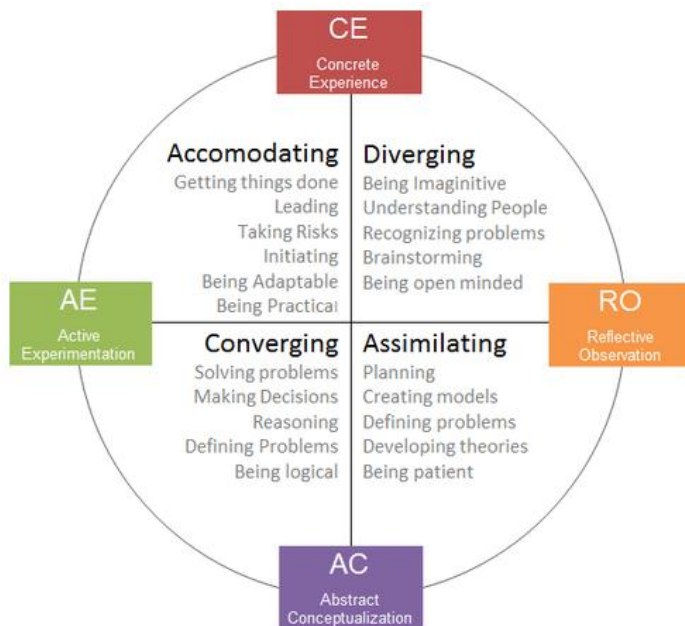
While the study of (Al-Mesedeen 2011) tried to disclose the effect of common learning styles for Mutah University students according to Kolb learning style and measuring its effect on both of their emotional intelligence and Achievement motivation. The results show that the most common is Diverging learning style and the less common is Assimilating-learning style. Whereas the study disclosed that there is no statistically significant effect for the learning style on both of their emotional intelligence and Achievement motivation.

The study of (Heydary 2015) aimed to construct an instructional-educational design according to the amended Kolb learning style and knowing its impact on mathematical self-efficacy and achievement in math for fourth grade science. The results showed that instructional-educational design contributes in giving teacher a new role in scientific content reorganization out of random and with regard to educational objectives that needed to be achieved.

The study of (Al-Otaybi 2016) aimed to impact of practices conducted by teachers of science with learners in the intermediate stage in the term of developed Kolb Model in their points of view in dealing with students participation and also in dealing with interpretation and understanding in sciences as viewed by teachers. The results showed that the individuals of the sample deeply agreed on sentences of science teachers' base with students' participation according to Kolb Model.

The study of (Al Thunaibat and Al Aboos) whose objective was recognizing the impact of using Kolb Model in acquiring the chemical concepts and transmitting the learning effect for the primary ninth-grade students. The results showed the effectiveness of the teaching method

relying on Kolb Model in acquiring the chemical concepts and transmitting the learning effect for the favor of the experimental group.



The learner's learning style is determined by the experiential mode and that person's learning preference. Figure no.2 The Learning Cycle and its Relationship to Learning Preferences and that classifies:

- The Diverging Style... These people are able to look at things from different perspectives. They are sensitive. They prefer to watch rather than do, tending to gather information and use imagination to solve problems. They are best at viewing concrete situations several different viewpoints. Kolb called this style 'Diverging' because these people perform better in situations that require ideas-generation, for example, brainstorming. People with a Diverging learning style have broad cultural interests and like to gather information. They are interested in people, tend to be imaginative and emotional, and tend to be strong in the arts. People with the Diverging style prefer to work in groups, to listen with an open mind and to receive personal feedback.
- The Assimilating Style... The Assimilating learning preference is for a concise, logical approach. Ideas and concepts are more important than people. These people require good clear explanation rather than practical opportunity. They excel at understanding wide-ranging

information and organising it a clear logical format. People with an Assimilating learning style are less focused on people and more interested in ideas and abstract concepts. People with this style are more attracted to logically sound theories than approaches based on practical value. These learning style people is important for effectiveness in information and science careers. In formal learning situations, people with this style prefer readings, lectures, exploring analytical models, and having time to think things through.

- The Converging Style... People with a Converging learning style can solve problems and will use their learning to find solutions to practical issues. They prefer technical tasks, and are less concerned with people and interpersonal aspects. People with a Converging learning style are best at finding practical uses for ideas and theories. They can solve problems and make decisions by finding solutions to questions and problems. People with a Converging learning style are more attracted to technical tasks and problems than social or interpersonal issues. A Converging learning style enables specialist and technology abilities. People with a Converging style like to experiment with new ideas, to simulate, and to work with practical applications.
- The Accomodating Style... The Accommodating learning style is 'hands-on', and relies on intuition rather than logic. These people use other people's analysis, and prefer to take a practical, experiential approach. They are attracted to new challenges and experiences, and to carrying out plans. They commonly act on 'gut' instinct rather than logical analysis. People with an Accommodating learning style will tend to rely on others for information than carry out their own analysis. This learning style is prevalent and useful in roles requiring action and initiative. People with an Accommodating learning style prefer to work in teams to complete tasks. They set targets and actively work in the field trying different ways to achieve an objective (McLeod, 2017).

The following table (Al Kasmi) illustrates the learning preferences according to the learning style in the terms of Klob style. As the researcher toke that into account during designing the AI environment based the educational program.

Table no(1)

Learner’s preferences according to the learning style

The first type - Integrates experience into self - Hears and participates in opinions - Has a various points of view - Works for harmonization - Interferes in person - Creative The preferred question... Why?	The fourth type - Integrates experience into application - Learns by trial and error method - Discovers new ideas himself/ herself - Interested in new things - Adapts to new situations - Reaches new conclusions by nature The preferred question... “What if”
The second type - Integrates watches into knowledge - Looks for continuation and proceeding - Knows what supervisors think of - Has a linear thinking (Communicative) - Acts using details - Criticizes information and collect data The preferred question... What?	The third type - Integrates theory into application - Tests theories and applies the perceptual knowledge - Solves the modest issues - Thinks strategically - Uses skills - Knows how things work The preferred question How?

3- Decision making skills

Abdul Karim (2007:275) defines “Decision” as is “The aware and conscious choice Choosing among the available alternatives in a specific situation”, whereas Taking Decision is “choosing the best alternative after studying the results of each and their influence on the objectives sought”. (Abu El Haggag, 2010) defines “the process or manner of rational choosing among the available alternatives to achieve a specific objective”.

Jarwan (2002) states that taking decision is a process including skills as:

- Skill of achieving desired outcomes clearly.
- Skill of determining all accepted and available alternatives.
- Skill of analysis alternatives after collecting sufficient information thereof.
- Skill of arranging alternatives in the list of priorities.
- Skill of alternatives assessment.
- Skill of choosing the best alternatives and authorizing for execution.

Al Mutairi (2017) briefs taking decision in the following points:

- It's a complex process including less complex processes, such as collecting and analysis of information.
- Needs special skills, the most important of these skills is generating alternatives and choosing the proper alternative.
- Related to the value adapted by decision maker.

The study of (Abu Al Hajjaims to recognize the (٢٠١٢ , effectiveness of training program that based on Six Thinking Hats in developing skills of making decision and curiosity impulse for the top girl students in Tharvat College. The results showed that there were statistically significant differences in the decision-making scale for the experimental group.

The study of Tamimi(2013) investigated the impact of the five-cycle learning model based on the system of e-learning in the academic achievement and decision-making skills of the female students of information management. The results confirmed the positive impact of the proposed model on the development of decision-making skills.

The study of Alhajahmah (2014) revealed the effectiveness of a training program based on Schwartz Model of Teach Thinking in the development of decision-making skills and problem-solving among a sample of students in the seventh grade. The results showed the positiveness of the program in influencing decision-making and problem-solving skills of the experimental group

The study of Al-Baqari (2016) aimed to identify the effectiveness of interactive teaching in the development of decision-making skills of secondary school female students. The results revealed the effective impact of reciprocal teaching on the development of argument and decision-making skills.

4- Attitude towards technology

Attitude is defined as "a relatively stable acquired system of an individual's feelings, information, and willingness to carry out certain actions, towards any topic. It is represented in the acceptance and rejection of this topic, expressed verbally or behaviorally, or even rejection and acceptance in dreams or through the gestures of the face and eyes. It tends to stable in the person to some extent," Abu Dawabah (2012). 15).

Attitudes towards technology are essential aspects that a student must acquire, in order to keep pace with the new technological developments that have been incorporated in various stages of university and pre-university education. The development of student attitudes is an important aspect for which higher education institutions must pay close attention. It is evident that modern means of communication increase the overall communication of the majority of students in an intimate and comfortable way, more than in case of face-to-face communication with teaching members, as the latter may cause fear of confrontation and shame among students(Awad& Hilles, 2015).

Motahar (2011) identifies three components of attitudes:

- Cognitive component in which information and ideas developed by the individual towards the object or incident;
- Affective component in which the general feeling of the individual towards something; and
- Behavioral component shows the action of the individual and indicates his attitude towards something.

Azmi (2014) identifies the following principles for changing attitudes:

- Providing new information to the individual to be affected
- Directing the message directly to the topic of attitude
- The objectivity of persuasive message or information to be used to change attitudes with both positive and negative characteristics
- Recognizing that there are strong or pivotal attitudes that have great weight in defining the individual's roles in life and in perceiving oneself and others

Ardies & De Maeyer (2014) cited the factors affecting the attitude towards technology:

- Aspirations for a technological career or a technology-related job
- Interest in technology as a desire to know or recognize technology
- Perceived difficulty of technology
- The perceived consequences of technology, that is, one's feelings about the positive (or negative) effects on the environment and society.

Malthew et al (2018) studied the attitudes of a group of university students from two different universities towards the use of technology and the disclosure of their preferred learning resources. The results indicated that participants enjoy learning how to use the new technology and believe it is working to improve their learning and prepare them for future jobs. Books / papers were the most preferred sources of learning, followed by laptops, while tablets and smart phones were less favored. The results also revealed that they preferred learning through a combination of traditional resources (such as books and paper) and digital technology tools.

Farwani (2012) conducted a study aimed at identifying the students' attitudes towards using synchronous and asynchronous communication in the e-learning environment in the Salfit educational area at Al-Quds Open University. To achieve the objectives of the study, the researcher used descriptive and analytical statistical methods. The most important of which are: Students' attitudes towards the use of synchronous and asynchronous communication in the e-learning environment in the Salfit Educational Area were moderate. The absence of statistically significant differences in the level of use of synchronous and asynchronous communication in the e-learning environment in the Salfit Educational Area is attributed to each of the variables (age, sex, marital status, student profession). The absence of statistically significant differences in the level of use of synchronous and asynchronous communication in the e-learning environment in the Salfit Educational Area is attributed to each of the variables (level of academic year and academic program). In light of the findings of the study, it recommended the need to strengthen the e-learning environment in the (Salfit) educational area and take into account the weakness of the infrastructure of Internet services in (Salfit) and to urge further studies in the Salfit Educational Area.

Second: Study procedures:

After compiling the research literature and previous studies, the study included the following procedures:

1- Identifying the study population

The study population consisted of female students of King Khalid University, College of Education, Department of Psychology, third grade in the academic year in Hijri (1440-1441) and their number are (90) students.

2- Study sample selection

The study sample consisted of:

- a) Exploratory sample: It consisted of (10) female students in the same academic year in AC 2019/2020 in order to control and codify the various study tools and was excluded from the basic sample of the study.
- b) Basic sample: This included the selection of two groups, one of which is the control group and the other is the experimental group, among third-grade female students and their number are respectively (30) and (32) students and they were randomly selected.

3- Experimental design of the study

The present study relied on one of the designs of quasi- experimental research, a pre-and-post design for the two groups (control-experimental).

4- The educational design model needed to implement the current study

Designing an AI-based learning environment in light of the Kolb Model has required the application of one of the well-known educational design models. It is the basic process, as it helps the designer take into account all the factors and conditions affecting the effectiveness of teaching and learning. Design models provide a visual form in which the relations between the processes are clear. Design models are the required tool for the designer, and there are many models of design in general, whether Arabic or foreign, but the researcher adopted the model of Mohammed Attia Khamis (2007) for a number of reasons, including:

- This is a comprehensive model that includes all the necessary procedures for the good instructional design of any educational content.
- This model is suitable for an educational design in general whether it is the design of e-curricula, multimedia programs, or personal learning environments.
- This model combines structural, cognitive, and behavioral theory.
- This model combines behavioral and structural theories in a logical smooth manner. Students achieve goals, build knowledge, and conduct activities. Then they are measured by various measurement tools.

- This model is concerned with different learning styles, whether it is individual, group, or public style, and this will benefit the researcher in the nature of dealing with the tools of the environment of artificial intelligence in light of Kolb model.
- The ability to develop the model is flexible enough to enable the researcher to add some steps for the proposed learning environment.
- In this model, the researcher made an amendment to the general education strategies section to match the nature of the learning environment based on artificial intelligence in light of Kolb Model.

1- Analysis phase, where the following steps were taken:

Determining the Ideal Performance: The researcher has determined the ideal performance after reviewing the curriculum of (Computer in Education), as well as reviewing some references of the course, which are referred to in the theoretical framework of the study in order to come up with a list of ideal general objectives and they

2- Design phase:

It aimed to develop specifications for learning resources and processes and designing and establishing the content:



Figure no.3

Experiencing the test in the designed environment



Figure no.4

The most important elements of content in the designed environment

Smart learning content has also been used to design a digital curriculum and content across a variety of devices delivered through several types, including video, audio and online-assistant. The steps can be represented in sequence as follows:

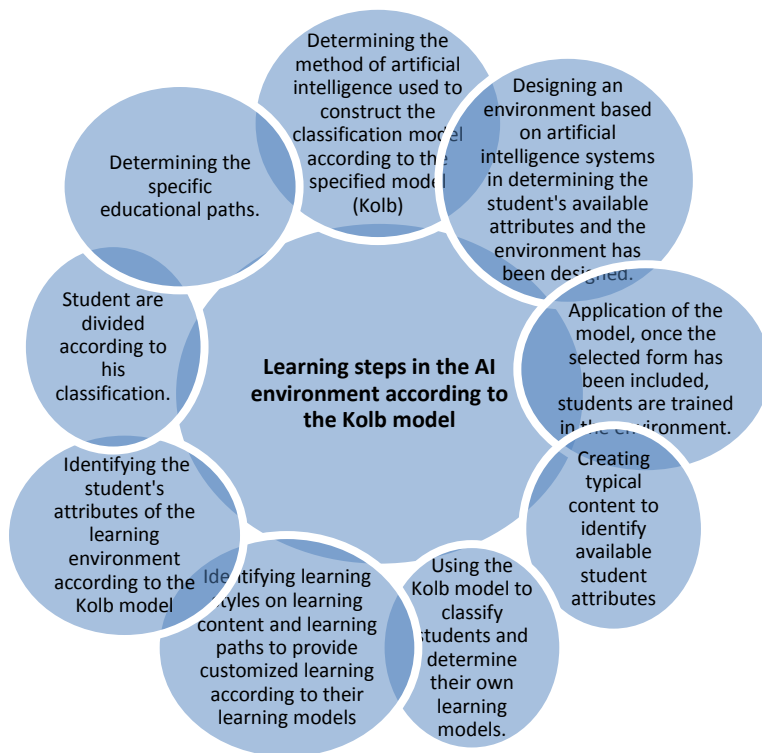


Figure no.5

Learning steps in the AI environment according to the Kolb model

3- The stage of educational development in which: Scenarios preparation

Assessment and Adjustment of Scenarios: The initial picture of the e-environment scenarios was presented in the light of an AI strategy in the light of the Kolb model for supervisors of educational technology specialists, thus finalizing the proposed educational strategy scenario.

1. Conducting montages and organizing operations within the educational site through:
 - Reserve a Domain on the Web (<http://www.intelligenceedu.com/>) to present the AI learning environment.

4- Final Evaluation Phase:

At this phase, the learning environment presented in accordance with the AI strategy is applied in the light of the Kolb model

Detailed information on all stages of instructional design can be found at the following link:

https://drive.google.com/file/d/1w5p2Ra1A1_4QLjVz0v1MQmoRWenI4vrC/view?usp=sharing

The program begins by presenting a set of questions to the student to determine the appropriate learning style for her according to the Kolb model, and then directing her to the appropriate learning program for her

Questions on the link:

<https://www.eduolog.com/en/test/kolbs-learning-style-test/>

The four learning styles scenarios at the following link:

<https://drive.google.com/drive/folders/11DAGcm9ap9ZJ-oJQiCl2Cqg4DqqHVwxL?usp=sharing>

Study tools

A-Preparing the achievement test

1. Objective of the test: Measuring the achievement aspect related to the content of the curriculum of (Computers in Education)
2. Determining test content: Analyzing content objectives into cognitive objectives, performance objectives, and categorizing learning objectives, including the required level that a student should reach after completing her study of the contents of each lesson, and formulating them in a measurable procedural format.
3. Preparation of specifications table, relative weight and importance of test subjects: After analyzing the content with its basic elements, the researcher determined the relative weight of

the topics of each unit as shown in the table based on the percentage of the number of sub-elements found in each lesson as follows:

Table no. 2
Relative weight of the topics of each unit

Sr.	lessons	number	Percentage
1.	Computer Network Technologies	5	18%
2.	Applying artificial intelligence and expert systems in education	6	21%
3.	Applying e-learning and virtual reality in education	6	21%
4.	Educational technology devices	5	18%
5.	Projectors and computer	6	21%
6.	Total	28	100%

Test vocabulary articulation: Test vocabularies should be Restricted-Response question (Multiple choice questions) MCQs are among the most objective in terms of their use and appropriateness for measuring learning outcomes, because it can be graded easily and it is difficult to be guessed.

Preliminary template of the test: The researcher prepared the preliminary template of the test, and then was presented to the specialized arbitrators in order to identify the following: The accuracy of scientific and linguistic vocabulary articulation and in the light of what was proposed by the arbitrators, the researcher made the required adjustments and the test consists of 28 paragraphs, and then the researcher applied it to the exploratory sample in order to measure the ease and difficulty as well as the test time Set time $350/5 = 70$ test time The test score = 28, so the score is calculated for each accurate question.

Determining the validity and reliability of the test: After presenting the approval of the supervisors, the researcher calculated the validity of the internal consistency between the vocabulary, and the total grant of the test ranged between 0.765 and 0.923 which is a value at the level of 0.01, and the stability of the test: The researcher applied the test to a sample of (10) female students with an interval of fifteen days and the value of the correlation coefficient between the test clauses was 0.876, which is statistically significant at 0.01, which enables the researcher to apply the test.

B - The scale of decision-making skills

In the present study, the researcher adopted the decision-making scale of Tarawneh (2006). It consists of (56) words divided into eight main skills:

(Understanding the problem and identifying it - Determining the objective or objectives - Thinking about the requirements of decision-making - Requesting mental support from others - establishing alternatives - Arranging alternatives and differentiating among them - Choosing the best alternative - Implementation), The researcher has confirmed the validity of the scale by being exposed to a group of expert supervisors to express their opinion on the adherence of the terms of the scale to the sub-dimensions and the integrity of the articulation, the ratio of the coefficient of conformity among the residents is 96% using Cooper equation. 0.678 and 0.893, which are statistically significant at 0.01, which enables the researcher to apply the decision-making scale.

C - Technology Attitude Scale (Artificial Intelligence)

1.The objective of the scale: The scale aims to identify the attitude of students towards technology (artificial intelligence)

2.Scale construction steps: The researcher establishes the scale according to the following steps:

First, review the theoretical studies and frameworks that dealt with the attitude towards technology, namely (Malthew et al, 2018), Kapley (2013) and Farwani (2012).

Second: The researcher prepared the initial template of the scale and was (32) a attitude towards technology (artificial intelligence), the scale was presented in its initial template to a number of supervisors, and I have asked them to judge the scale in the light of the followings: Appropriateness of the terms articulation, presenting any remarks on the amendment, addition or deletion. The amendments have been made and approved by the supervisors, where the scale is in its final form (27) words.

Third: Validity and stability of the attitude scale towards technology, the ratio of the coefficient of conformity among the residents is 87% using Cooper equation. On the scale as a whole, the value of the correlation coefficient was 0.862, a statistically significant value at the level of 0.01, which enables the researcher to apply the measure of the attitude scale towards technology.

analyzing and discussing the outcomes:

To answer the validity of the first hypothesis, which states that "there is no statistically significant difference at the level of (0.05) between the average scores of experimental group students who studied in an AI learning environment in the light of the Kolb model and the scores the control group students who studied the traditional method in the Achievement test. .”

The researcher applied the test and used the C test to compare the average of two independent samples. T) Independent Samples. V) Using SPSS for windows. 22) To calculate the significance of the differences between the average scores of female students in the **achievement test in the telemetry. The results were as follows:**

Table no. 3

The averages as well as the standard deviations and the value of (T) to determine the significance of the differences between the average scores of female students of the experimental and control groups in the post-application in the achievement test

Groups	Applic ation	Sam ple	Aver age	Stand ard devia tion	Flexib ility degre e	(T) value	Statistical significance at (0.05) level
Experi mental control	Post	30	17.47	2.19	60	15.59	Function value of the experimental group
		32	10.50	1.22			

According to the previous table it is clear that the average scores of the students in the experimental group in the achievement test in the post-application is (17.47) degrees, while the control group in the post-application was (10.50) degrees respectively, which means that the average score of the students of the experimental group came higher than the average of the students. Members of the control group and the researcher can explain the difference in the following figure:

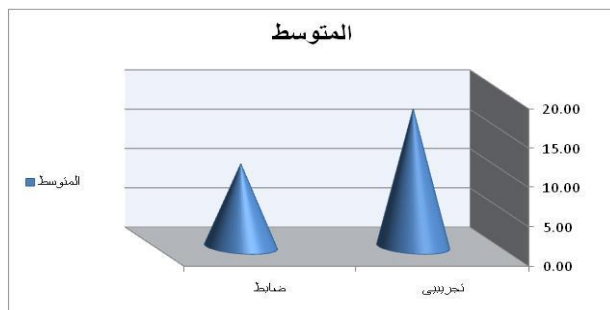


Figure no.6

To clarify the average differences in the post-application of the experimental and control group on the achievement test

The average ratios in the dimensional application are higher for the experimental group than for the control group, indicating the efficacy of the experimental treatment substance used in the current research, an artificial intelligence-based learning environment that has had an effective effect on the collection of students at King Khalid University's College of Education in light of Kolb's experiential learning theory. The researcher thus rejects the zero-yield hypothesis that there is no statistical connotation and acceptance of the alternative hypothesis that "there is a statistically significant difference at a significant level (0.05) between the average grades of the experimental group students who studied in an artificial intelligence-based learning environment and the grades of the control group students who studied in the traditional way of the test, and the results are consistent with the results of the studies on the AI-based learning environment, and both study: survey Al-Najjar, 2012), survey (Mousa, 2014), survey (Al Saud, 2017), survey (Ajam, 2018), survey (Azmi, Ismail, and Mubarz, 2014), and survey of each (Reis, Paladini, Khator, Sommer, 2006: 448-464).

The results of studies on the application of the Kolb's experiential learning theory in education such as (Ahmed, 2004), (Nasr, 2009), study (TSOI, 2009), study (Abu Zeid, 2011), study (Al Musayyaedin, 2012), (Al-Haidari, 2015), study (Al-Otaibi, 2016), and (Dance and Oboas, 2016)

The researcher attributed that to:

- 1- the design used takes into account the individual differences among female students, and offers various activities that are suitable for female students with learning preferences included in the Kolb model, between direct activities that have a specific answer (proximity), and between (divergent) activities that have more than one possible answer, as well as activities that are appropriate for the method (Assimilationist) by presenting abstract concepts, reflecting observation, and (adaptive) using concrete experiences and effective experimentation, which helped to develop their Learning achieved
- 2- The high achievement of the experimental group students is due to the fact that they have studied in a way that the ideas, words, and symbols were translated into mental images, so that the information has long been borne in their mind, while the control group students have traditionally studied with little thought or a connection between them and their prior knowledge, which has led to their forgetting after a short period
- 3- also The high achievement of the experimental group students is due to the fact that they have studied in a way that the ideas, words, and symbols were translated into mental images, so that the information has long been borne in their mind, while the control group students have traditionally studied with little thought or a connection between them and their prior knowledge, which has led to their forgetting after a short period

The second hypothesis states: "there is no statistically significant difference at the level of (0.05) between the average scores of experimental group female students who studied in an AI learning environment and the scores of control group female students who studied the traditional method at the scale of attitude towards technology. "

The researcher applied the scale and used the C test to compare the average of two independent samples. Using the statistical package SPSS for windows (V 22) to calculate the significance of the differences between the average scores of the students of the sample in the decision-making scale in the telemetry. The results are as follows:

Table no.4

The averages as well as the standard deviations and the value of (T) to determine the significance of the differences between the average scores of female students of the experimental and control groups in the post-application in the decision-making scale.

Groups	Applic ation	Sample	Average	Standard deviation	Flexibilit y degree	(C) value	Statistical significanc e at (0.05) level
Experime ntal	Post	30	310.60	1.45	60	29.06	Experiment al function
control		32	211.81	18.55			

According to the previous table it is clear that the average scores of the students in the experimental group in the achievement test in the post-application is (310.60) degrees, while the control group in the post-application was (211.81) degrees respectively, which means that the average score of the students of the experimental group came higher than the average of the students. Members of the control group and the researcher can explain the difference in the following figure:

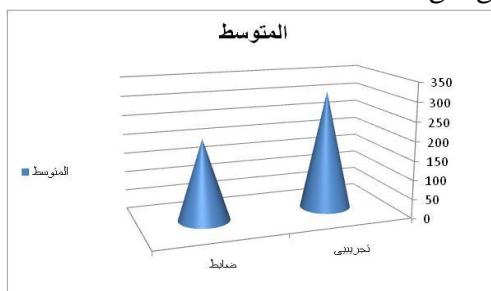


Figure no.7

To clarify the average differences in the post-application of the experimental and control groups on the decision-making scale.

It is evident that the average percentage in the post-application for the experimental group are higher than the control group, which indicates the effectiveness of the AI learning environment in the this research, which had an effective impact on the grades of the experimental students who studied in the AI learning environment and those of the control group who studied the traditional way of decision-making scale.

Thus, the researcher rejects the Null Hypotheses as there is no statistical significance and accept the alternative hypothesis, which "has a statistically significant difference at the level of (0.05) between the average scores of students of the experimental group who studied in AI learning environment and those of the control group students who studied the traditional method in the decision-making scale. The results of the study are consistent with those of: The study of (Abu Al-Hajj, 2012), the study of (Al-Tamimi, 2013), the study of (Al-Hajahajuma, 2014), and the study of (Al-Beqari, 2016).

The researcher attributed this to the fact that the applications of artificial intelligence in the light of the Kolb model for students has increased the students' self-confidence in research and investigation and follow the scientific steps in accessing and analyzing information, which led to the development of their ability to make decisions including other scientific mental skills to reach the appropriate decision.

"There is no statistically significant difference at the level of (0.05) between the average scores of experimental group female students who studied in an AI learning environment and the scores of control group female students who studied the traditional method at the scale of attitude towards technology. "

The researcher applied the scale and used the C test to compare the average of two independent samples. (Independent Samples .T Test. Using the statistical package SPSS for windows (V 22) to calculate the significance of the differences between the average scores of the female students of the sample at attitude towards technology scale according to the telemetry. The results are as follows:

Table no. 5

The averages as well as the standard deviations and the value of (T) to determine the significance of the differences between the average scores of female students of the experimental and control groups in the post-application at the scale of attitude towards technology.

Groups	Application	Sample	Average	Standard deviation	Flexibility degree	(C) value	Statistical significance at (0.05) level
Experimental	Post	30	77.27	1.98	60	41.87	Significant for the experimental group
The control group		32	52.41	2.63			

According to the previous table it is clear that the average scores of the students in the experimental group in the achievement test in the post-application is (77.27) degrees, while the control group in the post-application was (52.41) degrees respectively, which means that the average score of the students of the experimental group came higher than the average of the students. Members of the control group and the researcher can explain the difference in the following figure:

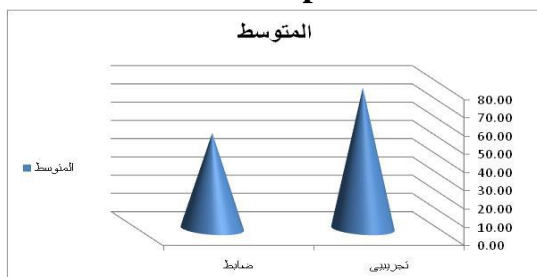


Figure no. 8

Clarifying the average differences in the post-application of the experimental and control groups on the measuring the attitude towards technology

It is clear that the averages in the post-application are higher for the experimental group than for the control group, which indicates the effectiveness of the learning environment based on artificial intelligence in the current research, which had a prominent effect on the scores of the experimental female students who studied in the learning environment based on artificial intelligence and those of the control group, who studied in the traditional way of measuring the attitude towards technology.

Therefore, the researcher rejects the zero hypothesis of the absence of statistical significance and accepts the alternative hypothesis, which is "there is a statistically significant difference at the level of significance (0.05) between the average scores of the female students of the experimental group who studied in a learning environment based on artificial intelligence and those of the control group who studied in the traditional method in measuring the attitude towards technology." The results of the study are consistent with the study of : (Maltheu et al, 2018), Kapley (2013), and Farwani (2012).

The researcher attributed this to the fact that the applications of artificial intelligence in light of Kolb Model provided the students with greater interaction with technology, especially with the techniques of

artificial intelligence and the students felt the pleasure and advanced learning results, which led to the development of their attitude towards technology in general and especially towards artificial intelligence.

The fourth hypothesis states: “There is no effect of the independent variable in the learning environment based on artificial intelligence in light of Kolb Model on the dependent variables of the researcher (decision-making skills, academic achievement, and the attitude towards technology) among the female students of the College of Education at King Khalid University.

From the above it is clear that the independent variable (strategy based on artificial intelligence) has a statistically significant impact on the dependent variable (cognitive achievement), but does not indicate the size of the impact. To measure the size of the impact of a strategy based on artificial intelligence for the development of cognitive achievement, decision-making, and the attitude towards technology: The researcher used the equation of squared Eta η^2 . Based on the values of (T) resulting from comparisons between the average scores of the pre- and post-application on the experimental group, and as η^2 represents the ratio of the total variance in the variable by converting the value of the squared $ETA\eta^2$ to the value of (d) by having the following equation: $d = \frac{2\sqrt{\eta^2}}{\sqrt{1-\eta^2}}$, as (d) is the impact size of the effect in light of the criterion set by Ibrahim Alfar (2005). The criteria for determining the value of (d) is : from 0,2 to less than 0,5 (weak) ; from 0,5 to less than 0,8 (medium); and from 0,8 (big) and the following table illustrates this.

Table no.6

The impact size of an AI-based learning environment on research variables

Research tool	Degree of freedom	Value of (T)	Value of (η^2)	Impact size(d)	Degree of impact
Achievement test	60	15.59	0.89	4.09	Big
Decision making	60	29.06	0.96	7.50	Big
Attitude towards technology	60	41.87	0.98	10.81	Big

The table shows:

1. There is a statistically significant difference for the level of influence of the independent variable (the effect of the learning environment based on artificial intelligence in light of Kolb Model on the dependent variable (cognitive achievement). It was found that the value of (15.59) is an acceptable value for the first hypothesis of the research hypotheses and for identifying the impact of a learning environment, based on artificial intelligence in light of Kolb Model, on the dependent variable (cognitive achievement). It is also clear from the table that the value of the impact size (d) was (4.09), which is 0.8 (greater than the value set by Ibrahim Al-Far (2005)) which indicates that the impact of the learning environment based on artificial intelligence in light of Kolb Model had a significant impact on the development of cognitive achievement among the sample students.
2. There is a statistically significant difference for the level of influence of the independent variable (the effect of the learning environment based on artificial intelligence in light of Kolb Model on the dependent variable (cognitive achievement). It was found that the value of (41.87) is an acceptable value for the first hypothesis of the research hypotheses and for identifying the impact of a learning environment, based on artificial intelligence in light of Kolb Model, on the dependent variable (cognitive achievement). It is also clear from the table that the value of the impact size (d) was (7.50), which is 0.8 (greater than the value set by Ibrahim Al-Far (2005)) which indicates that the impact of the learning environment based on artificial intelligence in light of Kolb Model had a significant impact on the development of cognitive achievement among the sample students.
3. There is a statistically significant difference for the level of influence of the independent variable (the effect of the learning environment based on artificial intelligence in light of Kolb Model on the dependent variable (cognitive achievement). It was found that the value of (29.6) is an acceptable value for the first hypothesis of the research hypotheses and for identifying the impact of a learning environment, based on artificial intelligence in light of Kolb Model, on the dependent variable (cognitive achievement). It is also clear from the table that the value of the impact size (d) was (10.81), which is 0.8 (greater than the value set by Ibrahim Al-Far (2005)) which indicates that the impact of the learning environment based on artificial

intelligence in light of Kolb Model had a significant impact on the development of cognitive achievement among the sample students.

Research recommendations

Based on the findings of this research and linking to previous studies, the researcher recommends the following:

1. Preparing the university environment at King Khalid University in a way that enhances and develop decision-making skills and the attitude towards technology using artificial intelligence techniques.
2. Providing opportunities for students, male and female, to participate and interact through discussions, analysis and rethinking about what they hear or read, which helps them develop higher-order thinking skills and predict the future, and propose new actions based on the new gained experiences .
3. Holding seminars and courses to train college members on how to use and apply existing learning environments based on artificial intelligence, and on their educational significance for the success of the educational process.
- 4.Emphasizing that the success of learning using learning environments based on artificial intelligence does not happen quickly, but requires the effort and persistence of those involved in the educational process.

Research suggestions

In light of the results of this study and linking it with previous studies, the researcher proposes the following:

1. Studying the impact of using artificial intelligence applications on the development of other advanced mental skills such as critical thinking, reflective thinking, and creative thinking among undergraduate students.
2. Studying the impact of integration between AI learning environments and other types of learning among male and female students at the undergraduate level.
3. Studying the effect of using artificial intelligence on developing scientific research skills among postgraduate students.
4. Studying the impact of using smart learning environments in developing technological skills among undergraduate students.

Availability of data and materials

Data and material for this study is not available because of the application was made using the Learning Management System (Blackboard), which is a closed system that allows access only to faculty members and students in the educational institution.

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Ethics declarations

Competing interests

The author declares no competing interests.

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