"Effect of Employing Interactive Mind Maps Across the Web on Developing Research Skills in Information Sources, Interaction and Electronic Participation Among Students of the Department of Educational Technology"

Associate Prof. Abdel Raouf Mohamed Mohamed Ismail

Arab East College for Graduate Studies - Riyad- KSA

South Valley University – Qena - Egypt

amismail@arabeast.edu.sa

Abstract:

aimed of the current research is to measure the effect of employing interactive mind maps via the web on developing research skills in information sources, interaction and electronic sharing among educational technology students; For this purpose, the researcher developed an e-learning environment, and applied the research to a sample of (44) male and female students of the second year of the Education and Information Technology Division, The researcher used the one-group experimental design, and the measurement tools were applied before and after, which consisted of the skill test associated with measuring the skill side of research skills in electronic information sources, a scale of electronic interaction and sharing, and after conducting statistical treatments; The researcher and the research concluded that there is a statistically significant difference between the average scores of the experimental group on both developing research skills in information sources, interaction skills and electronic participation due to the main impact on employing interactive mind maps across the web, and in light of the foregoing, the researcher recommended many recommendations and proposals related to The variables of the current research can be used in the scientific and practical aspect.

Keywords: Interactive Mind Maps-Research Skills in Information Sources-Interaction and Electronic Participation

INTRODUCTION:

It comes within this framework to learn about the patterns and methods of learning that provoke the educational process towards knowledge and to learn the required skills easily. Mind maps, in their digital/computerized framework, are an educational pattern that can be relied upon to achieve optimal learning outcomes, and this is reflected in the current research's detailed systematic approach to it that reflects its ability to achieve learning outcomes and achieve the objectives of the current research.

Muhammad (2012) refers to interactive mind maps as: educational visual schemes based on computer software techniques, through which the teacher aims to reorganize the knowledge and skill building of students through the use of colors, keywords, symbols, and imaginary images, which contributes to making the most of the accuracy and structures of the content in a way. Structured structure that is easy to organize, store and acquire in the learner's cognitive structure. The interactive mind maps came in the light of the classification of *Nong, & Bang, & et.al (2009)* mental maps into two types, the first type is the traditional hand-drawn mind maps that use paper and pen, the second type Interactive/computerized mind maps, which depend in their design on computer programs and software.

Interactive mind maps are an organizational thinking tool in processing information in human memory, and then retrieving information previously stored in memory, in addition to being an effective and creative way to arrange ideas, and speed learning. All interactive mind maps share their reliance on the use of colors, and all maps use Interactive mental lines, symbols, and words as well as visual graphics, thus converting notes into an organized, colorful and memorable scheme that works in a manner similar to how the brain works. *(Buzan, & Tony, 2002)*

Land (2000) indicates that learning, which is accompanied by new guidance and methods in the presentation of educational content, motivates the learner, increases his motivation and ability to learn, raises the ability to think and encourages him to review and complete the learning task, reduces the cognitive burden on him, and the success of the process Web learning depends on the learner's motivation and ability to learn, and it may have an effective impact on the various learning outcomes addressed by the current research. or different learning strategies.

With the progress of science and the flourishing of knowledge, the learning environments via the web have become a fertile digital environment for practicing all knowledge and skill activities of science through its employment of various electronic information sources through which students and researchers derive the sources of knowledge they need to provide information for their academic courses and scientific research; By searching the Internet, students can access free lessons from the most powerful international universities, learn about opportunities for obtaining scholarships, and obtain free training materials that promote self-development, in addition to a very important feature, which is to support the research and studies they are working on, and obtain opinion *polls (Khamis, 2013, 84).*

Saafan (2010) stated that electronic information sources are those that are made available through a computer medium or through the web, in the form of printed versions or published on a direct electronic medium; While *Khamis (2015, 89)* defined them as electronic resources that can be accessed by computer, or online, and they have at least one of the Internet sites, and they may have other copies in other sites, and he reminds them that they are every reference scientific work published electronically, It has a presence among electronic groups, and it was defined by Misfrah bint Dakhil Allah bin Misfer (2009) as: Any scientific work that can be benefited and dealt with by electronic media, whether it is available on the web, or through subscribing to electronic databases, or found on CDs, or modern technical media available for storing information, and whether it is directly generated in electronic form, or Converted from a hard copy.

In this context, *Haken (2006, 7)*, and *Muhammad (2017)* see that interaction and participation are among the modern educational trends, which are analogous to individual learning through the teacher,

educational television or textbooks, in traditional learning patterns, or through educational software and multimedia discs. Integrated into the modern style of learning, the Internet has added the possibility of the participation of a large number of learning peers in a positive and organized learning environment, by engaging students and teachers in discussion, dialogue, criticism, and exchange of views on all issues and targeted study topics represented in academic communication networks.

Al-Hassan's study *(2011)* also found the importance of activating research skills in electronic information sources, which was inferred from the high percentages that appeared in the reasons for using research skills in electronic information sources, represented in preparing a research plan, following up on trends, preparing lectures, teaching purposes, These percentages were explained as follows: the speed of access to information by 96.5%., the newness of information by 96.3%., the possibility of downloading and printing by 95.5%., ease of dealing and searching by 92.5%., non-compliance with the factors of place and time by 88.5%., The quality of the information is 78.8%.

The study of *Labib (2007)*, *Habeishi (2012),* and *Fawzi (2010)* indicated the importance of developing the skills of interaction and electronic participation among learners at different levels and educational stages because of its impact on the development of the cognitive aspect and skill performance: which they emphasized the effectiveness of the learning strategy. Participatory based on interaction and participation between group members and collaborative e-learning environments. In this context, the results of several studies indicated the effective impact of the content presentation style using visual stimuli, including the study of *Garrison, & Vaughan (2008)* through open educational resources on the performance of learners in some schools. The researcher found an increase in learners' satisfaction with the learning process through it, Increasing the interaction and participation of learners in the learning process through the communication and communication tools provided by the e-learning application environments, as well as increasing the rate of cooperation of colleagues in managing the learning process.

The research problem is mainly supported by the different results and recommendations of the conferences and studies that were presented and are detailed in the following regarding the impact of the use of educational sites and networks available on the web in a way that students interact and share with each other and with their teacher through the provision of educational content provided through them, and educational technology research, including *Morsi's study (2019)*, as *Khamis (2013, 129:128)* points out, aims to solve educational problems, improve educational technology performance and practices, and improve learning outcomes.

The study of *Zhu, & Cherm (2011)* and the study of *Chen, & Fuyc (2009)* also found that training students in research skills in electronic information sources via the web contributes to raising their academic achievement, and the length of time they spend in information sources via the Internet has a relationship Positive academic performance, as a study conducted by *Ren (2000)* on a sample of 85 undergraduate students who were educated on electronic search in various sources of knowledge across the web revealed an improvement in the students' ability to search in electronic information sources.

The study of *Hafez (2010)* also recommended the need to pay attention to research skills in electronic resources, in addition to the informative availability of electronic information sources, and to identify the reality of the available electronic resource's services, and the extent to which the beneficiaries benefit from these sources. One of the most important problems facing the beneficiaries is their lack of knowledge of these sources. *Al-Dhafiri* and *Al-Suwait (2013)* study recommended encouraging conducting more courses for faculty members and students that help introduce them and develop their research skills in electronic information sources.

The need to conduct this study also stemmed from the findings of *Nguyen, & Klein., & et al (2005)*; *Pulchino (2006)*, which indicated that the technical framework is not available in the design processes

for the patterns of displaying educational content, whether in terms of concept, characteristics or components, in addition to the need to design and produce visual interactive patterns according to the procedures followed in the design processes, and conclusive evidence is not available in Determining which design patterns of support are more appropriate and effective in the rate of skill performance, in line with the nature of the educational content of research skills in electronic information sources and skills of interaction and electronic participation; As *Gustafson (2000, 42)* explained This shortcoming is that they were not produced by educational institutions, and some of the designers of those patterns (mind maps) differed in clarifying and defining the procedures for their design and production accurately, so the interactive mind maps and their crystallization in an interactive framework via the web in an interactive e-learning environment is still relatively new and needs Further research and study.

The problem of the current research also emerged through the researcher's observation of the faculty members' reluctance to use new patterns and methods provided through web technology, which can be invested in the educational process, and their impact and feasibility in studying the educational content, especially with the time allotted to teach the courses they have is not It is sufficient in addressing the inquiries and problems they face in studying the course, which results in a significant loss of the ability to interact and share, even on a personal level in the learning environment.

Determining the research problem and its questions: From the above, it was possible to identify the problem of the current research in: "The need to develop research skills in information sources, interaction and electronic participation among educational technology students through the use of interactive mind maps via the web in an e-learning environment," and in the context of the current research problem crystallized The main question is as follows: How can interactive mind maps be employed via the web and measure their impact on developing research skills in information sources, interaction and electronic participation among educational technology students? The following sub-questions are derived from the main question:

RESEARCH QUESTIONS.

1. What are the criteria for designing interactive mind maps in a web-based learning environment?

2. What are the research skills in electronic information sources that need to be developed among the students of the research sample?

3. What are the electronic interaction and sharing skills that need to be developed among the students of the research sample?

4. What is instructional design in employing interactive mind maps in a web-based learning environment?

5. What is the impact of using interactive mind maps via the web on the development of:

   - Developing research skills in electronic information sources for students of the research sample?

   - Developing the skills of interaction and electronic participation among the students of the research sample?

RESEARCH AIMS.

1. Determining the criteria for designing interactive mind maps over the web in an e-learning environment.

2. Determining the research skills in electronic information sources that need to be developed among the students of the research sample.

3. Determining the electronic interaction and sharing skills that need to be developed among the students of the research sample.

4. Measuring the effect of employing mind maps via the web on developing research skills in electronic information sources for students of the research sample.

5. Measuring the effect of employing interactive mind maps via the web on the development of interaction and electronic participation skills among the students of the research sample.

RESEARCH IMPORTANCE.

1. Directing the attention of those responsible for designing and producing electronic educational platforms to take advantage of the design pattern to display educational content using interactive mind maps.

2. An attempt to present a proposed model for the design and production of learning environments based on the use of interactive mind maps via the web, as an example in the field of e-learning technology applications.

3. Directing the attention of the designers of various e-learning environments and programs to the importance of taking into account active learning strategies represented in interactive mind maps via the web in proportion to the readiness of the learners' living memory to retain as much information as possible, which affects the development of research skills in information sources, interaction and electronic sharing.

4. Providing educational and technological treatment that may help teachers take into account learning methods through the electronic learning environment with the aim of helping the learner to learn more effectively.

RESEARCH PARAMETERS: The current search was limited to the following parameters:

- Objective determinant: The scientific content is limited to the development of research skills in electronic information sources, including: the skill of dealing with the web, the skill of using search engines, the skill of forming a search strategy, the skill of dealing with the search options model, the skill of dealing with the components of the main pages in search engines, The skill of evaluating research results and processes, interaction and electronic sharing among the students of the research sample, its importance for the teacher and the learner, and the stages of its preparation in light of the scientific and technical standards that must be available. Email and discussion groups, the skill of text and video conversations, the skill of dealing with social networking tools and sites, the skill of interaction and electronic sharing associated with communication tools for educational social websites.

- Human determinant: represented in a sample of (44) students from the second year of the Education Technology Division, Faculty of Specific Education in Qena, South Valley University.

- Locator: Faculty of Specific Education in Qena, Department of Education and Information Technology, South Valley University in Qena.

- Technical Specifier: Using the Edraw Mind Map 6.5 program to produce mind maps, with consideration to the nature of the design and the presentation of the content included for each of them.

RESEARCH METHODOLOGY and its variables: The current research belongs to the developmental research that uses the descriptive analytical method in the research and analysis stage, and the quasi-experimental method to measure the impact of the independent variable for research on its

dependent variables in the evaluation stage. The research variables consisted of: The independent variable: It included: Employing interactive mind maps via the web. Dependent variable: It included two dependent variables: developing research skills in information sources and electronic interaction and sharing.

EXPERIMENTAL DESIGN OF THE RESEARCH. In light of the independent variable of the current research, the experimental design with one experimental group was used; Where the research sample of (44) male and female students was randomly selected, and the measurement tools were applied before and after on the experimental group.

MEASUREMENT TOOLS: The current research, based on its variables, included two measurement tools related to a skill test to measure the skill aspect related to developing research skills in electronic information sources, and the measure of electronic interaction and participation.

TWO RESEARCH HYPOTHESES: 1. There is a statistically significant difference at the level of significance ≤ 0.05 a between the mean scores of the experimental group students in the pre and post applications of the skill test related to the development of research skills in electronic information sources, due to the main effect on employing interactive mind maps in an e-learning environment. – 2. There is a statistically significant difference at the level of significance ≤ 0.05 a between the mean scores of the experimental group students in the two applications, pre and post, of the electronic interaction and participation scale, due to the main effect in employing interactive mind maps in an e-learning environment.

RESEARCH TERMS.

1. Interactive mind maps, after the researcher's review and review of many previous literature and studies, and in the light of which it was possible to reach the following procedural definition as: "An educational style that uses visual data charts that work in a hyperlink with which the learner interacts in presenting information with educational content and installing it in an organized network structure In it, information ranges from general to specific, which helps the student in the good organization of knowledge and skill building. It is highly dependent on self-learning and symbolic learning through which it combines words, symbols, images and colors, which are prepared using computer programs to help that.

2. E-learning environment, procedurally defined in the framework of the current research as: An environment that provides students with plenty of freedom to roam through a range of interactive media and objects related to interactive mind maps across the web.

3. Research skills in information sources, which are the amount of knowledge and skills that students of the experimental group need to search in electronic information sources through which they are sources of knowledge they need to supply information for their academic courses and scientific research; By searching the Internet, they have access to free training materials that promote self-development, in addition to supporting the research and studies they are working on. Research skills are related to the nature of the research he is doing and the level of depth required by the research. The sources of information research vary between direct contact electronic information sources, full-text electronic information sources, bibliographic electronic information sources, textual information sources with digital data, and interactive information sources.

4. Electronic interaction, defined by the researcher procedurally, as communication and remote communication that takes place in a synchronous or asynchronous manner by means of interaction tools in e-learning in an active and continuous manner using interactive tools between all elements of the educational process in the e-learning system in order to achieve the desired goals for this type of education Broadly in the form of a conversation or dialogue between two or more people,

such as: video conferencing, e-mail, etc., and it is multi-directional in different numbers and with different organization of groups within the learning environment that makes the learner effective, This activity positively affects the learner and others, and the interaction takes many forms, either between the learner and the content, or between the learner and the teacher, or between the learner and technology, or between the learners themselves, through the e-learning environment in employing interactive mind maps.

5. Electronic participation, which the researcher defines procedurally as the use of communication tools and communication technology over the web; So that it allows learners to participate and learn in a timely manner, whether synchronous or asynchronous, which gives the opportunity to build and develop knowledge, and this helps in building knowledge and skills in an orderly manner between the members of the collaborative learning groups and the electronic communication environment to reach the achievement of the task using synchronous and asynchronous communication tools, so that he can Learners discuss their ideas and offer their opinions, allowing an exchange of ideas and information related to the topic of learning, as it is a term that includes a variety of educational methods.

THEORETICAL FRAMEWORK FOR RESEARCH.

1. INTERACTIVE MIND MAPS.

Land (2000) indicates that learning, which is accompanied by new guidance and methods in the presentation of educational content, motivates the learner, increases his motivation and ability to learn, raises the ability to think and encourages him to review and complete the learning task, reduces the cognitive burden on him, and the success of the process Web learning depends on the learner's motivation and ability to learn, and there may be a link between the style of displaying content using interactive mind maps and the learner's personality traits Represented in the high and low level of self-learning ability that can have an effective impact on the various learning outcomes that are addressed by the current research, and this comes within the framework of what was recommended by the study of *Abdul Hamid (2009)* to the need to conduct research on the impact of the interaction between learning methods and cognitive methods or strategies different learning.

1.1. Interactive mind mapping concept. It has been pointed out by *Nong, & Bang., & et.al (2009)* that digital mind maps, which depend in their design on computer programs such as I-Mind Map, Mind Manager8, Free Mind9, Mind View3, do not require that the user has graphical skills because it automatically creates maps with smooth curves of the branches, and it also allows dragging and dropping images from the graphic library. Google Draw app; This and other similar applications add new capabilities and capabilities to the interactive mind map that can be used to serve both the teacher and the learner.

1.2. Advantages of using interactive mind maps in the fields of teaching and learning. Several studies indicated the advantages of using interactive mind maps for both the teacher and the learner in the fields of teaching and learning, including the study: *Al-Mawlid (2009)*, and *led (2009)* related to the capabilities of interactive technology, including: flexibility in terms of design; It allows the individual to make adjustments to the map in an easy way related to rearranging topics and ideas in a way that allows the development of the current map; So that it becomes another new map, and so on, in addition to providing the opportunity for collaborative work, and this is not provided by electronic mind maps, as it is characterized by the diversity of options available for colors, graphics, images and symbols, and is characterized by linking ideas with relationships among them, or with files or other maps, Some of them also provide the feature of automatic conversion of the contents of the map into written text that can be edited in regular text editors such as Microsoft Word. A logical representation that is easy for the mind

to perceive and store easily, which constitutes the formation of a sound cognitive structure for learners and those in charge of the teaching process.

The study of *Aysegul, & Seyihoglu (2010)*, which aimed to know the views of primary school teachers on the use of mind maps in the subject of life science and social studies, found that many teachers emphasized the appropriateness of mind maps to assess students, as the results of the study showed; The usefulness of mind maps in summarizing and as an introduction to the lesson and developing the skills of exploration, imagination and creativity among learners. It also increases the student's retention of the scientific material and makes education fun and entertaining. In addition, it is an effective tool of visual learning tools because it combines words, colors and graphics.

1.3. The effect of using interactive mind maps on developing aspects of learning (cognitive and skill). The study of *Nong, & Bang, & et.al (2009)* concluded that interactive mind maps achieved statistically significant differences in students' academic achievement in psychology compared with hand-drawn mind maps, and the traditional method, and hand-drawn mind maps achieved statistically significant differences compared to With the traditional method, the results also indicated that there are positive trends towards the use of mind maps, where most of the students indicated that mind maps provided them with support in learning in various fields, including the classification of ideas, Understanding concepts, working in groups, in addition to that, students of interactive mind maps indicated that mind maps provided them with support in categorizing ideas more easily, and research showed that a number of students of the experimental group used mind maps in various fields, however, some students showed difficulty In adapting the technique of interactive mind mapping.

1.4. Philosophical and theoretical foundations in employing interactive mind maps across the web.

It is clear that the employment of interactive mind maps in an e-learning environment via the web depends on the principles of constructivist learning theory, which emphasizes the importance of prior knowledge as a framework for learning new knowledge, while mind maps are a graphical pictorial technique that relies on the principles of information processing theory in representing ideas, observations, and elements that represent The basis of the educational content or problems in a coherent framework organized in the presentation of the content, and the map is organized from related ideas; In it, the information is organized in a sequential manner or in the form of a network, starting from comprehensive general topics and ending with topics and sub-examples, and the interactive mind map is a more visual means than concept maps, and it can be represented as a knowledge tree, that is, it takes the structural tree character in dealing with knowledge and methods of processing it in addition to that More simplified.

According to the behavioral theory, course topics can be designed in the form of digital mind maps. One of the most important principles of the behavioral theory is to formulate content stimuli in a gradual way, from easy to difficult, and from simple to complex, to help the learner perceive, understand and acquire them, Where each element of the course is presented, either theoretically or procedurally, using positive and negative examples (creating digital mind maps to explain a course gradually from easy to difficult for research skills in electronic information sources and skills of interaction and electronic participation and providing appropriate reinforcement to support the behavior required to obtain satisfaction and achieve learning Required and attention to the processes of repetition of behavior (through interactive mind maps at any time through the electronic learning environment), in order to strengthen the link between stimuli and responses (*Al-Ayid, Al-Shaya, 2018, 61*).

The theory of social learning, which is characterized as having a logical basis, emphasizes the individual differences between learners and the diversity of their interaction with all elements of learning; This is what happens when the learner watches interactive mind maps, which depend on self-efficacy, observation and learning, which is one of the most important concepts in social learning theory,

especially interactive mind maps in which a topic is presented. Questions are asked to the learner through it, leaving an opportunity for him to think and respond before he sees the answer, thus encouraging the learner to participate, as he feels that he is part of each of the stages. The learner can also be given the opportunity to learn by reading interactive mind maps that aim to teach skills. *(Al-Eid and Al-Shaya, 2018)*

2. SEARCHING ELECTRONIC INFORMATION SOURCES.

2.1. The importance of acquiring research skills in electronic information sources. The study of *Zhu, & Cherm (2011), Chen, & Fuyc (2009)* found that training second-grade (intermediate) students in research skills in electronic information sources via the web contributed to raising their academic achievement through the scores they obtained in the achievement test. The length of the period they spent in information sources via the Internet had a positive relationship with their academic performance, as the study revealed that it was based on a sample of 85 undergraduate students who were educated on electronic research in various sources of knowledge over the web for the English-language creation course at Rutgers University. An improvement in students' ability to search electronic sources of information.

Several studies have also indicated a relationship between Internet search skills, the use of electronic information sources, and academic performance. Where the showed study *Tella, & Tella. & et al (2007), Ross., & Willoughby (2009)*, *Awas, & Ausman, & et al (2008)* indicate that students with web-based and research skills and abilities make better use of electronic information sources and their academic performance. The studies also found that those who practiced research skills in electronic information sources became more aware and responsible in choosing what websites they browse on the web, in addition to the fact that the information sources available on the web are effective in academic aspects, developing their personal skills, and performing their academic tasks successfully and successfully, The results also showed that the students who use the web to search for information and increase it in the context of the educational content provided to them are those with high cumulative rates, in addition to the fact that it was possible to obtain information from all over the world, which gave it a universal tint.

2.2. The relationship of designing e-learning environments and providing research skills in electronic information sources.

Akbulut & Cardak (2012), Abdul Aziz (2015) point out that e-learning environments provide universality as a new vision for the teaching process in what is currently called global learning, as it provides learners with new horizons in the learning process, while eliminating all restrictions related to learning processes, with Providing the opportunity to communicate with various electronic information sources through the broadcast and dissemination of educational media easily and conveniently, consistent with the nature and characteristics of the learners' psychological, personal and pedagogical, which gives learning an effective color that is consistent with the global system in the learning process; It helps to break out of the traditional local educational framework. It also needs a small number of teachers; E-learning requires the fewest possible number of teachers to provide education to the largest possible number of learners.

In addition, *Ragab (2011)* indicated that e-training systems provide a variety of training methods (visual - audio - printed) in which every learner finds what suits him, which achieves the ease of searching in electronic information sources through the available alternatives, options and various educational materials through Web networks and electronic learning resources that allow for multiple levels of content, while working to stimulate the learner's mental abilities through a variety of stimuli that address the different senses, making the opportunity to provide information through the web an easy matter that pushes learners to increase from various electronic knowledge sources.

It also works to classify e-learning environments into three types: content (text, multimedia), presentation, and navigation. This classification helped the learner follow any pattern that he might use

in navigating knowledge and obtaining enhanced information; Where each category or basic technology is divided into a number of methods, which share with each other in an overlapping and interrelated process to obtain information *(De Bra, & Smits., 2013, 136)*, and they are knowledge-based systems, and they have their own structure that distinguishes Between the presentation of knowledge and the processes of obtaining it and the logical conclusions associated with this knowledge *(Khalil, 2004, 49)*, the learner is also provided with aids and assistance during learning until he reaches the point of being able to use research skills in electronic sources of knowledge and information. *(Issa, 2009, 24)*.

2.3. Theoretical foundations in the use of research skills in electronic information sources.

Al-Subhi, Al-Abri (2014) explained that the philosophy of using research skills in electronic information sources is based on a set of foundations, the most important of which are: providing all facilities to help the student gain experience from the contents of information sources, providing technical and administrative support from the management of information resource technologies in educational institutions, Facilitating direct communication between the centers of information resources and the public of beneficiaries of students, teachers and researchers, and therefore the philosophy of electronic information sources is linked to the goals that the needs of students go, which works to raise their efficiency, and provide electronic resources that are available with the nature of learners to raise the output of the educational process and achieve increased learning in quantity. and type and ability to apply.

The communicative theory indicates that the employment of interactive mind maps via the web is of great importance in communicative theory by adapting technology to facilitate the teaching and learning process. Where interactive mind maps via the web focus on the learner, and this means that the role of the learner in the education process has changed and has become the focus of the educational process. The role of the teacher has changed from being a source of information to being a facilitator, organizer and planner of the learning process, and this educational situation takes place in an environment rich in sources of information and knowledge Hence the importance of interactive mind maps via the web in the communication theory, one of its most important principles is that learning takes place in different ways, including the courses presented through visual materials, which were represented in interactive mind maps via the web *(Aknan, 2018)*.

Technological, educational and scientific progress has been accompanied by a tremendous acceleration in the flow of information. Communication and computing have witnessed a qualitative development. The skill of searching for information, its diversity, and ways of using it has become one of the necessary skills that students must acquire. Until they are qualified to engage in the labor market, and the learner has the right to find someone to help him gain more information and master modern methods of research through them, because traditional research methods only have the ability to receive information without making sure of its correct source and confidence in the accuracy of the information associated with it, Research methods have become weak to meet the needs of students, and the accumulation of knowledge, which is a feature of the times, makes the textbook and the blackboard incomplete sources of learning. Where the various audio-visual means have become sources of knowledge and learning, starting from the audio tape and ending with the Internet.

3. ELECTRONIC INTERACTION AND SHARING SKILLS.

3.1. The concept of e-participation: participatory learning is a strategy or approach to learning based on working in groups to achieve one goal. In actual practice, the rest of the parts are the result of learning from peers), and group members meet to consult and discuss ideas and information acquired to produce new scientific knowledge or value or acquire new skills, and therefore it is learner-centered, and emphasizes learner-learner interaction, but with integrating environments E-learning has given

participatory learning an effective electronic character in the educational field, and it has changed from participatory learning in a traditional environment to participatory e-learning.

3.2. Characteristics of electronic interaction and sharing: The participatory learning via the web focuses on educational fields and is used by different or different learners working on the same learning topic via computers branching from a main office or through different networks, as it aims to support learners and build new knowledge effectively during the process of learning. Learning *(Khaled, 2007, 95)*. The researcher believes that interaction and sharing skills in participatory e-learning environments are a required interactive teaching method that allows each learner to cooperate with all his colleagues and participate with them in building their learning for the program with electronic skills, whether in synchronous or asynchronous meetings that have been conducted Consolidating them in the e-learning environment through which interactive mind maps have been employed., In the same context, *Al Bayaa (2015, 172)* defined interaction and sharing skills as the ability of a small participatory group of learners to perform a task or achieve planned common goals, in the specified time with the efficiency required to be achieved using effective communication and communication methods via the web or technological innovations. Solving problems and working as a team and also through individual and collective responsibility.

Interaction and sharing is one of the important concepts in the distance education environment. Many studies that have been concerned with defining the concept of interaction have focused on several aspects such as "active learning", "two-way communication", and "reciprocal distance learning". Therefore, the concept of interaction in a distance learning environment can be defined as "active learning that contains multi-directional communication and interaction between the elements of the educational process". When integrating the electronic dimension, the concept and terminology are as follows: Electronic interaction and sharing: defined by *Wegner (1994)*, It is the extent to which learners are able to participate in modifying the form and content of the environment at the same time with each other, as *Khamis (prev. reference, 218)* defines it as: a communicative dialogue and a mutual influence between a learner and an electronic educational program that can adapt and respond to the needs of learners It gives them an appropriate degree of freedom to control instruction, to actively participate in learning, and to construct information.

3.3. Types of Electronic Interaction.
Al-Zahrani (2018) indicates that the value of interactivity in e-learning stems from the extent to which learners and teachers are able to skillfully control video conferencing tools, interactive electronic activities, in order to achieve their own needs. This means that interactivity in e-learning requires higher thinking skills, including the ability to present ideas, and the ability to analyze and interpret directly or indirectly. The interaction occurs on three levels: the student's interaction with the course content; So that he is able to provide the learner with information, instructions, and instructions related to the scientific material, as well as provide the student with immediate feeding of his questions and inquiries, and to identify his abilities and skills. Usually included within e-learning curricula when they are designed, and the interaction of students with their colleagues comes through placing small groups of students with each other to carry out some activities. The fact confirms that discussion and interaction within such groups gives the student the opportunity to be able to think, analyze, and explain, and it increases the level of communication skills among students.

The researcher also used the interactive electronic activities used in e-learning, as it pushes learners to work, cooperate and acquire information and educational experiences by giving learners electronic activities and projects. of learning resources.

In order to create a fruitful electronic interaction and participation within the interactive mind maps style, it was described in the framework of the work through the e-learning environment, and it was processed electronically by dividing small work groups, as follows:

- Multi-group interaction, and in this style, the research sample in the group on which the interaction and electronic participation scale is measured is divided into four groups, each group has its own space for discussion, in addition to one assistant in each group, as each group cannot see the private discussion with other groups, all groups join and participate in one discussion topic to revolve around the discussion.

- Platform interaction, and in this style, students are divided into four groups who share the same educational task, and each group has one assistant, and the interaction takes place between these groups, and each group can see the activities of the other groups during the work, but without the ability to comment on them.

- The interaction of the sub-group, based on the selection of twenty-five students, with one assistant in this active group, and the members of the group were selected from the 44 students, where they participate and interact with the teacher effectively, while the rest of the participants can access these Discussions and access to them by reading only, without participating in them or commenting on them.

- The interaction of large groups, this style increases the student's dialogue space with the presence of one mediator for every 10 students, and this interaction is suitable for you in the two research groups of 44 students, and a number of additional assistants may join to accommodate the increasing number of questions and comments, and is characterized by that it can applied through and practice; To accommodate some specific topics that may require further discussion.

- Discussion interaction, this style uses the method of grouping, through which students can ask questions or comments and submit them to the mediator, and this is done through the electronic learning environment that represents the experimental material for the research, and the mediator collects these questions and comments and then publishes them, with the aim of deliberating and discussing With participants in the asynchronous discussion board, students participate in a general discussion and can then continue to ask questions or comments.

RESEARCH PROCEDURES AND STEPS.

First: Defining the criteria for designing interactive mind maps over the web in an e-learning environment, and this comes within the framework of answering the first question which states, "What are the criteria for designing interactive mind maps in a web-based learning environment?"; The list of criteria was extracted according to what is referred to in Appendix.1, and it was formed in light of the literature and references that dealt with the design of interactive mind maps in a web-learning environment, and theories of working environment design for interactive mind-maps in the web-learning environment were identified, The validity of the list of standards was confirmed by presenting it to some specialists in the field of educational technology to ensure the credibility and reliability of the standards, The required modifications were made in light of the modifications made by the arbitrators, and thus the list in its final form became valid for designing interactive mind maps in a web-based learning environment used in the current research. On (6) criteria, in addition to (34) indicators related to the tasks of those criteria in their application to the design of interactive mind maps in a learning environment via the web in the current research within the framework of designing an e-learning environment.

Second: Preparing a list of research skills in electronic information sources; This comes within the framework of answering the second question, which states, "What are the research skills in electronic information sources that need to be developed among the students of the research sample?"; The skills came according to a set of procedures that were taken into account and their requirements were determined, the needs of students and the dependent research variables, and those skills and preparation for them came in accordance with the study of *Al-Jarf (2003, 13)*, they were described as follows:

1. Preparing a list of research skills in electronic information sources. The results of the exploratory study revealed the urgent need for the majority of students to acquire and develop research skills in electronic information sources in general, and to train in their use of them. Country 2030, and although the web contains knowledge vessels across the web in various forms; However, the lack of experience and the necessary training to use them may lead students to not be able to use them to the appropriate extent and may be in line with the context of the new education system in the country that seeks to use electronic devices and restrict education to researching various electronic learning resources. The research skills in information sources varied between On-line electronic information sources, full-text electronic information sources, bibliographic electronic information sources, textual information sources with digital data, and interactive information sources.

2. Research requirements in electronic information sources. Research skills in electronic information sources require a number of requirements, including: a computer, modern operating systems such as (WIN: (7,8,10,13)), a memory of at least 32 megabytes, a modem with a speed of no less than 28 kilobytes, Screen resolution of at least 600*800 Pix, advanced web browsers, web access point, database subscription, or knowledge of databases provided by the Ministry of Education.

3. General and basic skills that students must have. Familiarity with the English language, ability to deal with web browsers including (Netscape, Internet Explorer, Navigator), using associated computer units, knowing web terms, exploring links to research websites, dealing with Help/Support commands, knowing various conventions associated with resources Electronic search in information, the ability to search in more than one system, and in light of the foregoing and after reviewing the literature and previous research that dealt with search skills in electronic information sources, including: the skill of dealing with the web, the skill of using search engines, the skill of forming a search strategy, skill Dealing with the search options model, the skill of dealing with the components of the main pages in search engines, the skill of evaluating search results and its operations.

Third: Preparing a list of electronic interaction and participation skills; Where the skills came according to a set of procedures that were taken into account and identified their requirements, student needs and dependent research variables, and those skills and preparation for them, which are addressed by the current research in electronic interaction and sharing, including: the skill of remote communication, the skill of communication and communication via e-mail and discussion groups, and the skill of Text and video conversations, the skill of dealing with social networking tools and sites, the skill of interaction and electronic sharing associated with communication tools for educational social websites.

Fourth: The proposed instructional design model in designing interactive mind maps over the web in an e-learning environment, and this comes within the framework of answering the fourth question which states, "What is instructional design in employing interactive mind maps in a web-based learning environment?", and in light of the concept and components Characteristics, criteria, philosophical and theoretical foundations and review of design models in e-learning and training via the web The researcher adopted the general model of educational design ADDIE, and the proposed model consists of: analysis stage, design stage, production stage, implementation stage, evaluation stage, and the following explains those stages in light of the procedures used in the current research:

a. Stages of Analysis: It Includes the Following Steps:
- Determining the goal of the design in employing interactive mind maps in a learning environment via the web: It represented in supporting students' performance in developing research skills in electronic information sources, and this was done using an electronic learning environment.

- Determining the support content: the support content was determined based on the description of the scientific content, and the experiment was applied in the second semester; In order to study the largest number of topics covered by the content, in addition to relying on some literature and studies related to research skills in electronic information sources represented in mind maps, in addition to the researcher's experience in teaching the topics that the course deals with in an expanded manner. The content selection is as follows: Cognitive aspects related to research skills in electronic information sources, including: (Introduction to electronic sources of information search, requirements for their use and employment, tools to assist in the representation of searches using electronic vessels for information and their applications", skill aspects related to developing research skills in electronic information sources, In the following topics: Requirements for their use and employment, their tools to assist in the representation of searches using electronic information vessels and their applications.

- Analyzing the characteristics of the performers: they are the students who perform the research skills in electronic information sources in the e-learning environment. The performance support is provided and the content of the support is determined based on their interests, needs, mental and psychological abilities and previous experiences.

- Determining the performance requirements: represented in: the possession of the students in the research sample of the following characteristics (dealing with the computer and its applications, the possibility of opening the website for learning processes via the web, the possibility of dealing with web applications, the possibility of dealing with the support content provided in various forms, whether by downloading those forms Or dealing with it on-line, the ability to use search engines across the web to access external support content, providing technical support in providing support for solving problems related to the environment and connecting to the Internet after being trained by the researcher and introducing them to the tasks of the electronic environment.

B. Design Stage: This stage aims to determine the procedural goals of using interactive mind maps design via the web in an e-learning environment, since the general objective of the current research is to identify the impact of employing interactive mind maps via the web in an e-learning environment in developing research skills in electronic information sources.

- Work page design: which relates to information on electronic resources to search for information and students' performance of their use skills, and in both of them, the required support is provided according to the design of electronic performance support used in employing interactive mind maps.

- Designing a control page by the researcher: to be able to monitor and follow up the performance, and update the performance support content for all students at the same moment whenever necessary (by deleting, adding and modifying), and on this page the names and data of the students, the date and time of entry and exit for each of them, and the number of times Entering the performance for each skill separately from the research skills in electronic information sources, and a presentation of their assessments. The researcher relied on designing the work environment within the framework of the following components: the knowledge database component, the system interface component, the expert system component, the support component, and the trainee component.

- Designing the performance support content and determining its presentation method: the presentation of the performance support content is organized hierarchically in the data hierarchy of the topics; Where you start by analyzing the complex task (main) into simpler tasks (sub-tasks) and so on until you reach a task that is not able to be analyzed, and the formulation of the content is taken into account simplicity and clarity and to be scientifically correct, as well as the use of "Hyper Text" which allows flexibility in moving between the elements of learning content for skills Without being constrained by their arrangement, it also enables him to access the information he really needs at the same time.

Interaction Design: The environment included several methods that ensure interaction between the learning poles and the learning resources within the environment, including:

- Interaction between the learner and the content: This was done through internal links that provide a degree of interaction with the content, while providing self-evaluation.
- Interaction between learners and interaction between learner and teacher: By using many methods of interaction, communication, including e-mail, news board, instructions, comments, participatory web editors, and chat points added across the environment.
- The interaction between the learner and the interaction interface with the environment.
- Interaction through face-to-face education: It takes place in the classroom and practical lessons in the school's computer lab, where discussion, discussion and questioning take place through lectures and group meetings.

- Designing the Teaching and Learning Strategy: As interactive mind maps work through an interactive e-learning environment on the web; Therefore, the teaching and learning strategy was limited to the individual support method; So that students have an active, positive and effective role in the performance of the tasks assigned to them, and when they have finished performing each sub-skill included in the main skill, they have to click on the counselor button to advise him to continue if they have been done correctly or ask for support (whatever type) if they are performed properly False.

C. Production Stage: What was required from various educational means for performance support content was produced through: Production of static pictured educational materials (interactive mind maps), still images were produced by the researcher by taking screenshots of the screens that are used to search for electronic information sources through The web, with clarification of the procedures followed in the research process, after it was processed with static interactive image processing programs, and displayed in the electronic support content through the system screens for electronic learning environments.

D. Implementation Stage: At this stage, interactive mind maps are designed in their initial form, by following the following: 1- Designing the frames with linking the frames and their associated branches, 2- After completing the design of the interactive mind maps in their initial form, they are presented to specialists and modifications are made. The web-based e-learning environment is tested on a sample similar to the target sample in order to gather their opinions and make the necessary adjustments.

E. Evaluation Stage: The evaluation stage included a set of the following procedures: The e-learning environment was presented to a group of arbitrators in the field of educational technology in order to ensure its safety and control, in light of the judges' opinions. The web in an e-learning environment on a pilot sample other than the main research sample; This is to check the quality of the support content; In terms of: scientific content, texts, multimedia tools, in addition to identifying problems and difficulties that may arise within the framework of the implementation of the basic performance experience, and through the exploratory experiment, the time of work and study in the environment and the patterns available in it in supporting electronic performance are determined.

FIFTH: PREPARING THE MEASURING TOOLS:

1. The skill test related to developing research skills in electronic information sources

- The objective of the skill test related to the development of research skills in electronic information sources: The test objective is to measure the level of students of the research sample in the skill aspects related to research skills in information sources in the test specification table: (Remembering, Understanding, Applying, Analyzing, Synthesizing), as shown in a table. 1.

Table 1. Specifications of the skill test associated with developing research skills in electronic information sources

n	Content	The level of behavior in the cognitive domain						Relative weight
		Remember	understand	application	analysis	composition	Total vocabulary	
1	Dealing with the web.	2	2	1	2	1	8	23.52%
2	Use of search engines.	1	2	1	1	1	6	17.64%
3	Configure a search strategy.	2	1	2	-	1	6	17.64%
4	Dealing with the search options form.	2	-	1	1	-	4	11.76%.
5	Dealing with the components of the main pages in search engines.	1	2	2	2	-	7	20.58%
6	Evaluation of search results and operations	2	-	1	-	-	3	8.82%
	Total Vocabulary	10	7	8	6	3	34	100%
	Relative Weight	29.41%	20.58%	23.52%	17.64%	8.82%	100%	

- Test Vocabulary: The test vocabulary has been electronically formulated in two forms: multiple-choice questions, and true-false questions. The number of test items in its initial form was (34) items, including: (18) items of the type of true and false questions, (16) items of the type of multiple choice.
- The validity of the test and the stability of the test: The researcher verified the validity of the test by presenting it to a group of arbitrators who specialize in curricula, teaching methods, educational technology, and educational psychology, to benefit from the test axes. Verification of the test's stability has reached (81%), which is in agreement with the statistically acceptable reliability coefficients, which range between (71%: 85%).
- Evaluation of grades. The test, in its final form, consisted of (34) items. The test vocabulary answer scores were estimated by placing a score for each correct answer and zero for each wrong answer, bringing the total for the test vocabulary answer to (34) degrees, and it was corrected electronically within the e-learning environment.
- Test time. After making the required modifications, the test was applied to an exploratory sample, and it was found that the time required to answer the test items was (45) minutes.

2. A measure of electronic interaction and participation through the electronic learning environment.

- **Preparing the Scale:** The aim of the scale is to measure the skills of interaction and electronic sharing among the students of the research sample, and to complement what was stated in the educational design of the e-learning environment according to the style of interactive mind maps across the web, the researcher prepared a scale in interaction and electronic sharing, and the terms of the scale were derived from the skills of The electronic interaction and sharing that the current research sought to achieve with the members of the research sample. As explained in Appendix (2).
- **Scale Correction Method:** The scale is corrected by giving a score, bearing in mind that the highest mark that a student can obtain is (23), which represents the number of scale phrases. It has a low ability to interact and electronic sharing if it gets a degree (less than 13), and this is measured by the same measurement in the second dimension in electronic sharing.
- **The validity of the internal consistency of the scale items:** All items of the scale are statistically significant to the total score of the scale at the significance level of 0.01, except for the items (8, 12, 17) that were excluded, so that the scale in its final form consists of (23) items.
- **The stability of the scale:** The researcher made sure of the stability of the scale through the stability of the analysis across individuals, where a number of students were interviewed, and with the help of a faculty member from the same community as the research sample from which the sample was

taken by interviewing five students, and then the number of times of agreement was calculated, and the number of times of difference, and the stability of the test was 83%.

Sixth: The exploratory experiment for research: The researcher conducted an exploratory experiment on a sample of students in the Education Technology Division at the Faculty of Specific Education in Qena from the same community as the basic research sample, their number reached (10) students; With the aim of identifying the difficulties that the researcher may encounter during the basic research experiment, ensuring the internal efficiency of the experimental treatment material, verifying the safety of the operating processes of the learning tools used in the interactive electronic learning environment, and estimating the stability of the measurement tools,The exploratory experiment revealed the stability of: the skill test in measuring research skills in electronic information sources and the measure of electronic interaction and participation. The exploratory experiment, in its entirety, revealed the validity of the experimental treatment material, and measurement tools related to measuring the variables that it addresses, in addition to addressing some technical problems. The environment revealed by the students of the exploratory sample and it was fixed.

Seventh: Determining the research sample: The basic research experiment was conducted, and it started with defining the research sample; Where the researcher randomly selected the basic sample of the study consisting of (44) male and female students in the Education Technology Division, and they were chosen in accordance with the experimental design of the one group, which studies learning topics using interactive mind maps.

Eighth: Post-application of measurement tools: The post-application of all measurement tools was carried out on the students of the experimental group, and after completing the application of the basic research experiment, the researcher corrected and monitored the scores of the skill test and the electronic interaction and participation scale, in preparation for dealing with them statistically.

NINTH: RESEARCH RESULTS, DISCUSSION AND INTERPRETATION.

1. Presenting the results of descriptive statistics for the skill test scores related to research skills in electronic information sources: The results of the pre and post application of the experimental group were analyzed in relation to the skill test, with respect to means and standard deviations, according to the variables of the current research, and a table. 2, show the results of this analysis.

Table. 2 The averages and standard deviations of the skill test scores associated with research skills in electronic information sources

Tool	Experimental group	Sample number	data processing	value	significance when ≤0.05
Skill test related to research skills in electronic information sources	pre	44	Av=11.52 Sd= 61.30	635.7	impact
	post		Ac= 36.51 Sd=76.20		

Referring to the results presented in Table (2), it is clear that there is a statistically significant difference between the mean scores in the skill test; It is attributed to the effect of the interactive mind maps variable on developing research skills in electronic information sources; The calculated q value amounted to (635,7), which is a statistically significant value at the significance level (0.05), with regard to their impact on the performance aspect related to research skills in electronic information sources, and therefore the first experimental hypothesis is accepted, meaning that: There is a statistically significant difference at the level of significance ≤ 0.05 between the mean scores of the students of the experimental group in the pre and post applications of the skill test related to the development of research skills in electronic information sources, due to the main effect on employing interactive mind maps via the web in an e-learning environment.

DISSCUTIONS:

What this result indicated can be explained by the fact that the students who studied with interactive mind maps were more positive in the acquisition of the skill aspect compared to the tribal application, and the interactive mind maps came with a relatively higher average. It provided the opportunity for the learner to obtain gradual levels of interaction, starting with the stage of individualizing learning through the learner's interaction with the content and studying the activities and resources available through the e-learning environment via the web.

And since mind maps depend on the principles of constructivist learning theory, which emphasizes the importance of prior knowledge as a framework for learning new knowledge, and on the principles of information processing theory in representing ideas, observations, and elements that represent the basis of educational content or problems in a coherent, organized framework of the skills in question, while It contained many concepts represented in a logical arrangement, which made it easier for the students of the experimental group to understand the content in its cognitive framework well, in addition to being more simplified, and this agrees with what was indicated by *Brinkmann, & Astrid (2003, 37).*, In addition to the above, the relationship between mind maps and the representation of ideas and concepts in teaching the theoretical/cognitive aspect of educational skills appears in a network form that is presented to group students within a comprehensive interconnected internal system, which contained important means to systematically demonstrate ideas and concepts related to skills, and the effect of mind maps appears. Interactive concepts of knowledge description and representation, and modern techniques and tools, as they are modern variables that have been applied in the training and learning process in teaching the academic content of skills, and teaching and training students on research skills in electronic information sources.

This result also agrees with the study of *Akinoglu, & Yasar (2007)*, which aimed to know the effect of using mental maps on students' attitudes and academic achievement and on concepts in science. On the cognitive side of skills and their relationship to academic achievement, it also agrees with the findings of *Abdel Razek's study (2012)*, that the use of the proposed interactive mind maps achieved a high impact size on the cognitive achievement of the experimental group students.

2. Presenting the results of descriptive statistics for the degrees of the electronic interaction and participation scale: The results of the pre and post application of the experimental group were analyzed for the electronic interaction and participation scale, with respect to means and standard deviations, according to the current research variables, and a table. 3, shows the results of this analysis.

Table. 3 Means and standard deviations of the electronic engagement and engagement scale scores

Tool	Experimental group	Sample number	data processing	value	significance when ≤0.05
Interaction and electronic sharing scale	pre	44	Av=7,24 Sd= 20,20	69,5	impact
	post		Ac= 15.72 Sd= 54.47		

Referring to the results presented in Table (3), it is clear that there is a statistically significant difference between the average scores in the skill test; It is attributed to the effect of the interactive mind maps variable on developing the skills of electronic interaction and participation; Where the calculated p-value amounted to (69,5), which is a statistically significant value at the level of significance (0.05), with regard to their impact on the performance aspect related to the skills of electronic interaction and participation, and therefore the second experimental hypothesis is accepted, that is: There is a statistically significant difference At the level of significance ≤ 0.05 between the mean scores of the experimental group students in the two applications, before and after the measure of interaction and electronic participation, due to the main effect on employing mental maps via the web in an e-learning environment.

DISSCUTIONS:

As the mind maps provided a good state of discussions and exchange of views and ideas about the electronic educational stimulus with the aim of modifying and developing it, based on the possibility of modification in the content of the interactive mind maps in line with the nature of the shape and quality of the skills to be produced, which leads the student to complete the lost knowledge; Where it can be useful in designing the educational stimulus better, and in the same context, this result is consistent with what was indicated in the study of *Muhammad (2012)* in interactive mind maps as: educational visual schemes through which the teacher aims to reorganize the knowledge and skill building; Which contributes to making the most of the accuracy and structure of the content in an organized structure that is easy to organize, store and acquire in the learner's cognitive structure.

It also agrees with what was indicated by *study Ibrahim (2007, 90)* that interactive mind maps as an educational tool are used in training to learn and teach information related to academic content and learning skills as a useful tool for organizing the learner's knowledge and representing changes that occur in his cognitive structure, and to reach The knowledge itself, because the mental map shows in a pictorial way the concepts related to the learning skills of the current research and their interrelationships in a sequential hierarchical structure, in which the most general and comprehensive concepts within a network of relationships are clarified., It is clear from the above that these types of interactions are limited to electronic discussions that take place between students, so we can call the discussion progress if its messages are responses that are linked in the context of the lecture and educational content to electronic interaction, and if the contents of the messages are not related to each other or outside From the scope of the lecture and the content, this type of electronic interaction is called.

Of the above, it should be noted in the framework of the previous search results; The reason for attention to mental maps is to take into account the individual differences between learners, which makes them achieve the principle of self-learning, and from here it works to form a relationship between mental maps as a style of displaying content and self-learning as a pattern or method of learning through it, which makes self-learning a place It is important to teach using this style when presenting educational content in the form of mind maps, as it is consistent with what was indicated by *Ibrahim (2007)* study about the effect of using mind maps in developing interaction and electronic sharing skills related to learning skills., The study of *Abbas (2014),* which concluded that mental maps formed a strong structure of concepts that made learning more stable, and worked on individualizing learning, as well as making the learner active and positive in making it consistent with the principles of self-learning, in that it achieves positivity and active learning and the participation of learners in achieving outcomes learning according to their individual preferences and differences; As it requires the learners to mental effort in how to access knowledge subjectively; Which achieved more learning, and better retention of concepts and relationships between them, and accordingly the relationship between interactive mind maps and the development of interaction and electronic participation skills appears.

TENTH: RESEARCH RECOMMENDATIONS.

- Encouraging the use of electronic information sources by subscribing annually to the available Arab electronic databases.
- The need for electronic information sources to be selected according to students' opinions, preferences and specialized needs after surveying their opinions.
- Focusing on the use of e-learning environments via the web within the framework of its features and characteristics through which effective and active learning is achieved, which aims to transfer the control of education from the teacher to the learner towards building a self-learning that is consistent with the learner's cognitive structure.
- The use of interactive mind maps in teaching courses because of their multiple advantages that impart interactivity and strong mental awareness in processing the learning content, and then increase the structure of academic achievement in the knowledge and skill sides.

- Using mind maps as one of the self-learning methods when training skills for students/teachers.

ELEVENTH: SUGGESTED RESEARCH:

- Conducting an evaluation study for Arab electronic information sources to find out their shortcomings and weaknesses and the obstacles to benefiting from them.
- Conducting a study on the training needs of undergraduate students to activate the use of electronic information sources available on the web.
- The effectiveness of using interactive mind maps in developing different thinking skills such as decision-making and reflective, deductive, critical, and scientific thinking.
- Conducting a study to reach a set of normative characteristics that in total constitute a better vision for the production of electronic educational communication applications related to the field of education in a more efficient manner that helps to acquire and develop the skills of electronic interaction and participation.

REFERENCES

Abdel Hamid, Abdel Aziz Tolba (2009). The effectiveness of using the web-investigation strategy in developing some levels of thinking and decision-making ability towards facing the challenges of technological educational modernization. Education Technology Journal, 19(1), Jan.

Akinoglu, Orhan; Yasar, Zeynep. (2007). The Effects of note Taking in Science Education Through the Mind Mapping Technique on Student's Attitudes, Achievement and Concept Learning. Journal of Baltic science Education, 6 (3), 34-42.

Aknan, Mona (2018). The communicative theory of Jürgen Habermas, Middle Affairs, Center for Strategic Studies, p. 158.

Al-Bayaa, Muhammad Farouk (2015). The differential effects of content management systems on the web to develop collaborative learning skills, unpublished master's thesis, Faculty of Specific Education, Port Said University.

Al-Hassan, Afaf Muhammad (2011). Medical electronic health information sources: A study of availability and use in medical and health science libraries in Khartoum State, the works of the twenty-second conference: Specialized information systems and services in Arab information institutions: reality, challenges, and aspirations, Publisher: Arab Federation for Libraries and Information, Manah.

Al-Khalidi, Hamad bin Khalid (2007). The role of local and global computer networks in promoting cooperative learning (a proposed conception, Journal of the Future of Arab Education in Qatar, (46), 95.

Al-Lahibi, Muhammad bin Mubarak, bin Saad, Ali (2004). "Informational Availability of Electronic Information Sources: Umm Al-Qura University Libraries Between Reality and Hope", King Fahd National Journal, 1, 1, March/August 2004. pp. 117-140.

Al-Zahrani, Mona Mohamed (2018). The effectiveness of using a virtual learning environment based on cognitive journeys through Facebook in developing the skills of interaction and electronic sharing among students of Princess Nourah bint Abdul Rahman University, Umm Al-Qura University Journal of Educational and Psychological Sciences, Umm Al-Qura University, Volume 9, P2.

Aysegul, Seyihoglu. (2010). The Views of the Teachers about the Mind Mapping Technique in the Elementary Life Science and Social Studies Lessons Based on the Constructivist Method. *Journal Of Educational Sciences*. 10, 1637-1656.

Brinkmann, Astrid (2003). Graphical Knowledge Display - Mind Mapping and Concept Mapping as Efficient Tools in Mathematics Education, Mathematics Education Review No 16 April 2003, p35-48.

Buzan, Tony (2006). Mind Mapping Kick Start Your Creativity and Transform Your Life Spin, Mateu Cromo.

Chen, S. Y., & Fu Y. C. (2009). Internet use and academic achievement: Gender differences in early adolescence. Adolescence, 44(176), 797-812. url: https://slideplayer.com/slide/8685974/

Chen, S. Y., & Fu Y. C. (2009). Internet use and academic achievement: Gender differences in early adolescence. Adolescence, 44(176), 797-812. url: https://slideplayer.com/slide/8685974/

Cummings, E.M. (2004): Re-learning El-learning., Darwin Magazine, retrieved from http://www.darwinmg .com/read /090101/relearn_content.html.

De Bra, P., Smits, D., van der Sluijs, K., cristea, A., Glahn, C., & Steiner, C. (2013). GRAPPLE: Learning management systems meet adaptive Learning environments. In Intelligent. In Intelligent and Adaptive Educational-Learning Systems (pp. 133-160). Springer Berlin Heidelberg.

Eid, Afnan Abdel Rahman, and Al-Shaya, Hessa Mohammed. (2018). Educational technology foundations and applications. Al-Rushd Library.

El Far, Ibrahim Abdel Wakeel (2000). The educational technology system in light of globalization and information openness", the seventh scientific conference, the educational technology system in schools and universities, period. From April 26-27, Journal of Education Technology, Volume 10, K3.

El-Far, Ibrahim Abdel-Wakeel (2003). Computer educators and the challenges of the twenty-first century. Second Edition, University Book House, Al Ain.

Garrison, D. R., & Vaughan, N. D. (2008). Blended Learning in Higher Education: Framework, Principles, and Guidelines John Wiley & Sons, Inc.

Gustafson, K.L. (2000). Designing technology - based performance support. Educational technology, 40(1). 38-44, retrieved from: http://www.bookstored.com/etp/gustafson.pdf.

Habeishy, Dalia Khairy Omar (2012). Employing participatory e-learning in developing field training for students of the Computer Teacher Preparation Division in the Faculties of Specific Education, Master's thesis, Mansoura University, Faculty of Specific Education, Damietta.

Hafez, Abdul Rashid (2010). Attitudes of undergraduate students towards the use of electronic resources, King Fahd National Library Journal, 16 (1), pp. 40-64.

Haken, m. (2006). Closing the loop - learning from assessment. Presentation made at the University of Maryland Eastern Shore Assessment Workshop. Princess Annam.

Ibrahim, Bassam Abdullah (2007). The effect of using the conceptual mapping strategy in teaching physics on developing the ability to think creatively and understand scientific concepts among the ninth graders. Teacher/Student Journal, (1, 2), 90-108, 2007, p. 90.

Issa, Sami (2009). A proposal to employ e-learning in developing some mathematical concepts for the deaf through artificial intelligence processors. Research presented to the First International Conference on E-Learning and Distance Learning - The Learning Industry for the Future. 16-18 March. Riyadh: The National Center for E-Learning.

Khalil, Muhammad (2004). The effectiveness of teaching programs based on artificial intelligence to develop computer skills. Cairo: an unpublished master's thesis. Faculty of Education. Helwan University.

Khamis, Mohamed Attia (2013). Educational Theory and Research in Educational Technology, Dar Al-Sahab for Publishing and Distribution, Cairo / Vol. (1), I (1), p. 23.

Khamis, Mohamed Attia. (2015). E-Learning Resources: Individuals and Media. Cairo: Dar Al-Sahab for printing and publishing.

Labib, Duaa Muhammad Labib Ibrahim (2007). An electronic strategy for participatory learning in a course on computer operating problems on cognitive achievement, skills and attitudes towards them for students of the General Diploma in Education, Computer Education Division. Unpublished PhD thesis, Cairo University, Arab Republic of Egypt.

Misfer, Misfrah bint Dakhil Allah bin (2009) The extent of the use of electronic information sources, a case study of faculty members at the College of Computer and Information Sciences, Journal of King Fahd National Library, Vol. 16, p. 1, Publisher: King Fahd National Library, p. 113 – 130.

Mohamed, Reham Refaat (2012). The Effectiveness of Using Thinking Hats Strategies, Thinking Maps and Creative Problem Solving in Geography Approach in Developing Environmental Knowledge and Higher Thinking Skills for First-Year Students, *Journal of the Educational Association for Social Studies -* Egypt, Faculty of Education, Ain Shams University, March. P (40).

Mohamed, Reham Refaat (2013). The effectiveness of using digital mind maps in teaching the unit (the dangers that threaten the environment) in the geography curriculum on developing creative problem-solving skills for first-year secondary students and maintaining the impact of their learning, Journal of the Educational Association for Social Studies - Egypt, Faculty of Education, Ain Shams University, April. P (50).

Morsi, Walaa Ahmed Abbas (2019). Participation pattern within groups "synergistic-serial" based on interaction with the cognitive method "dependent-independent" in participatory personal learning environments and its impact on developing critical thinking skills and self-efficacy among students of educational technology, educational technology - studies and research, Arab Society for Educational Technology, p. 41.

Muhammad, Iman Zaki Musa (2017). The effect of the interaction between the sharing style and the assessment source in the social learning platform on the development of learning outcomes and the motivation for academic achievement among students of educational technology, educational technology - studies and research, Arab Society for Educational Technology, p. 31.

Nguyen, F. & Klein, J. D. (2008). The effect of performance support and training as performance interventions, Performance improvement quarterly, 21(1), 95 - 114.
.

Nguyen, F. (2006). What you already know does matter: expertise and electronic performance support systems. Performance improvement journal, 45(4), 9-12.

Nguyen, F.; Klein, J. D., & Sullivan, H. (2005). A comparative Study of electronic performance support systems, Performance improvement quarterly, 18(4), 71-86.

Nong, Bang Khanh; Pham, Tuan Anh; Tran, Thy Nu Mai. (2009). Integrate The Digital Mind Mapping into Teaching and Learning Psychology, 13th UNESCO-APEID International Conference and World Bank-KERIS High Level Seminar on ICT in Education, ICT Transforming Education Programme 15-17 November2009, Hangzhou, People's Republic of China.

Oakland, et al. (2000). Temperament-Based Learning Styles of Identified Gifted and Nongifted Students, Gifted, Quarterly, 44(3): 183-189.

Pulchino, J. (2006). Future direction in e-learning 2006 report, Retrieved March 29, 2006 from: http: www.elearningguild.org

Ragab Abdul Hamid, M. (2011). Adaptive E-Learning "Web Based VR Lab Tool". Symposium on University Education in the Era of Information Technology. Prospects and Challenges. Al-Madinah Al-Munawara: Taibah University. May 2011.

Saafan, Sami (2010). The effect of integrating smart learning systems and adaptive hypermedia in e-learning management systems on developing innovative thinking skills. The Sixth Scientific Conference of the Arab Society for Educational Technology in partnership with the Institute of Educational Studies, Cairo University - Digital Solutions for the Learning Society. Cairo: Arab Society for Educational Technology.

Shawky, Dalia Ahmed (2013). Forms of providing feedback in educational computer programs (animated agent / written text with audio commentary) and its impact on developing the skills of using the Internet among students with high and low achievement motivation, the Egyptian Association for Educational Technology, a series of studies and controlled research.

Shih, Y., Huang. R., & Chen, S. (2013). Incorporating Usability Criteria into the Development of Animated Hierarchical Maps. Journal of Educational Technology & Society, 16(1), 342.355. UK.

Tella, A., Tella, A., Ayeni, C. O. and Omoba, R. O. (2007). Self-Efficacy and Use of Electronic Information as Predictors of Academic Performance, Electronic Journal of Academic and Special Librarianship, v.8 no.2 (Summer 2007