The Effectiveness Of The Self-Questioning Strategy In Developing Scientific Research Skills Among Students Of The Faculty Of Education At Israa University

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ARTICLE INFO	ABSTRACT
	The objective of the current research is to identify the effectiveness of the Self-Questioning strategy in developing Scientific research skills, the research adopted the semi-experimental approach, the research tools consisted of lectures according to the Self-Questioning strategy, and Scientific research skills test, the research sample consisted of (80) male students, it was divided into an experimental group consisting of (40) male students learned according to the Self-Questioning strategy and a control group consisting of (40) male students learned according to the usual method, the search results indicated the following There are statistically significant differences between the mean scores of the experimental group and the control group in the post application of the Scientific research skills test in favor of the experimental group, there are statistically significant differences between the mean scores of the experimental group in the tribal and post application of the Scientific research skills test in favor of the post application, The research presented a set of proposals, including holding continuous training courses for faculty members in modern teaching methods, including theSelf-Questioning strategy.

Keywords: Self-Questioning strategy, Scientific research skills, students of the faculty of education. |

Introduction

Scientific research is one of the pillars of human knowledge in all fields of life, and possessing its skills has become an urgent need for the country in the age of information and rapid developments. Every society aspiring to progress, development and competition to reach universality must give scientific research and possess its skills great importance.

Scientific research is one of the three basic functions of universities; represented in education, scientific research and community service, " It ranks second in importance after academic education, and it is an important and vital element in its life as a scientific and intellectual institution" (Al-Shahrani and Al-Arifi, 2020, 662), so the university seeks to develop its skills among students, "The development of research skills has a direct short-term return in improving the work of educational institutions in theory and practice, and an indirect long-term return in achieving better rates in the fields of human and community development at the national level." (Al-Sayed, 2020, 139).

Because the scientific research plan and its correct skills are not only a matter of writing a certain number of pages, but it is first and foremost a process that needs thinking, thinking, criticism and a vision of the problem, its scope and importance, and the ability to draw a general framework and use methodological and technical methods to study the problem and reach decisions and solutions to it. (Abd Rabbo, 2005, 12) pointed out that scientific research skills provide a complete picture of understanding the problem and its solutions, and given the importance of scientific research, which has become an inevitable priority among the priorities. Since it is one of the requirements of the age of information and knowledge, it achieves for learners a vital goal, which is self-learning, which frees the minds of learners from the problems of preservation and indoctrination to

thinking, research and innovation (Ahmed, 2019, 145). Therefore, it was necessary to conduct a set of research and studies that develop scientific research skills using modern methods, methods and strategies based on the participation of the learner. This approach is consistent with the elements that reflect the design of education according to the constructivism theory, which can be seen as a philosophical position that is interested in building knowledge for the learner, which is a theory of knowledge and a theory of knowledge making. Among the strategies that belong to the constructivism theory is a strategy Self-questioning, which is based on" a set of questions that the learner directs to himself before, during or after learning; to facilitate understanding based on generating ideas and building relationships between the parts of the material(5) (Coyne, 2007,

Therefore, it is one of the most important metacognitive strategies "that adopt the principles of self-learning, which can only be done if the student is able to rely on himself by asking questions to himself and drawing blueprints for himself to solve those questions in a clear way." (Al-Saud and Al-Waeli2016, 32); this strategy is also in line with the "principle of constructivist theory, where the learner builds his own understanding of the topic by asking questions and searching for answers " (Al-Ajab, Al-Sitri, and Saleh, 2020, 758). Learners build their understanding or new knowledge by interacting with what they know or believe of ideas, events, or activities they have experienced before.

The learner's self-questioning strategy is supposed to "focus on deep learning and understanding. Answering the questions that the learner asks himself requires knowing, understanding, analyzing and perceiving relationships, and simulating learners' questions during learning increases their mastery of these skills" (Janssen, 2002, 156).

From the above, it is clear that the application of this strategy in teaching makes the educational process a positive and influential process by "helping learners to become more interactive with different texts to be involved with the teacher in their new learning" (16, 87).Joseph, 20

Based on the importance of scientific research skills, and the importance of the self-questioning strategy, the researcher saw the need to conduct research to know the effectiveness of the self-questioning strategy in developing scientific research skills among university students.

Research Problem

Universities have attached great importance to scientific research as the main pillar of progress, and it has become a special course for teaching it, as it is the basis for the formation of the researcher, and its proper preparation. Despite this, there is a clear weakness among students in the skills of scientific research, and this has been confirmed by many studies, and this is what the researcher noticed through his work at the university, and through the results of the scientific research skills test that he applied to the exploratory sample, and he also confirmed it through his review of some previous studies that agreed on the weakness of students in the skills of scientific research, including: the study of (crabs and disagreements, 2022), the study of (Mahmoud, 2020), the study of Mr. (2020) and the study of (wonder, 2020),

And the study of Akyurek &Afacan (2018), and this weakness represents an obstacle to accessing research with logical results that contribute to solving problems, and thus the advancement of higher education institutions and society in general.

Through the experience of the teaching researcher in the Faculty of Education at the university, he noticed that the weakness is not only caused by students, but may be due to the lack of methods used in teaching them to modern approaches to develop their skills in scientific research. Therefore, the current research comes in response to the directions of the University of Israa in terms of topics and teaching methods, and in response to the recommendations of some studies that confirmed the need to pay attention to scientific research and development, and the adoption of clear policies with regard to higher education and development programs, including: the study of (Al-Sayyad and Al-Salam, 2022), the study of (Khawaji and Abdul Wahab, 2022), the study of (Al-Saadi and Farhan, 2022), the study of (Abdul Muhith, Najm and Suleiman, 2022), the study of (Al-Otaibi, 2022), the study of (Ataa, 2022), the study of (Mohsen, 2021), and the study of (Shahrani and Al-Arifi, 2020), Ertakan Ritikan , Chandra, Herberatoy, Yoon, Tina, Saputra, Andrian (Ertikanto & Chandra & Herpratiwi & Yunarti & Tina & Saputra & Andrian, 2017), the study of Ayuob & Banjari, the Desirable, the Celtic and the Rooster (Ayuob & Banjari & Almarghoub, Alqulayti & deek, 2016), and the study of Sutassuwan & Sumalee, W. (Sutassuwan & Sumalee. & Supsombat, 2016), anda study (2012,Subahan et.al).

During the research to reach modern teaching strategies in scientific research education, it encourages students to think about what they read, and develops their scientific research skills in terms of: directing questions about the reading, generating new ideas about its content, and finding effective solutions to the problems in its content. The researcher found that the self-questioning strategy is what can provide students with all of this. Self-generation of questions are signals towards deep understanding of the reading text, and at the same time it is a reason to explore what the learner's mind cannot understand.

Through the above, and in addition to the lack of previous studies locally that dealt with the effectiveness of the self-questioning strategy in developing scientific research skills at the university level, to the knowledge of the researcher, this research comes to meet the continuous needs to develop scientific research skills in the light of modern strategies, and thus the problem of research is determined in the following question:

What is the effectiveness of the self-questioning strategy in developing scientific research skills among students of the Faculty of Education at Israa University?
The importance of the study:

− The planners and developers of the teacher preparation program at the Faculty of Education at Isra University may be useful in organizing and presenting university courses in a way that allows self-questioning, and training students in the strategy of self-questioning at the undergraduate level in general, and the postgraduate stage in particular.

− It is hoped that it will reveal the skills that must be available to students of the Faculty of Education in the field of scientific research.

− The importance of the category dealt with in the research, which is the fourth-year students in the Faculty of Education at Al-Israa University, as it is the stage that must provide students with the scientific research skills necessary for all the research that he accomplishes and to write projects correctly and with a sound scientific methodology.

− The research may be a reflection of the need to keep pace with modern technological developments in universities, to catch up with human development, which is the main goal of higher education.

− Faculty members at the university may benefit from the results of the current research in preparing training programs aimed at developing students' scientific research skills that reflect their needs in the sub-skills they need to acquire.

Research objectives:
The current research aims to identify the effectiveness of the self-questioning strategy in developing the skills of scientific research among the students of the Faculty of Education at Israa University, from which the following objectives branch out:

1. Detecting the differences between the average scores of the students of the experimental group and the scores of the students of the control group in the post-application of the scientific research skills test.
2. Detecting the differences between the average scores of the students of the experimental group in the two pre-post applications to test the skills of scientific research.

Research Questions:
1. What is the effectiveness of the self-questioning strategy in developing scientific research skills among students of the Faculty of Education at Israa University?
2. Are there statistically significant differences between the mean scores of the experimental group students and the scores of the control group students in the post-application of the scientific research skills test?
3. Are there statistically significant differences between the mean scores of the experimental group students in the two pre-post applications to test scientific research skills?

Research hypotheses: The following hypotheses were tested at a significance level (0.05):
1. There are no statistically significant differences between the mean scores of the experimental group members and the scores of the control group members in the post application of the scientific research skills test.
2. There are no statistically significant differences between the mean scores of the experimental group members in the two pre-post applications of the scientific research skills test.

Search variables:
1. Independent variables: A self-questioning strategy.
2. Dependent variables: Scientific research skills.

* search limits :
Spatial Boundaries: The research was applied in the Faculty of Education at Isra University.
Time limits: The first semester of the academic year (2023/2024).
Human Limits: All fourth-year students in the Faculty of Education at Isra University.
Objective limits: It was limited to the course of scientific research methods for fourth-year students in the Faculty of Education, which includes a number of theoretical lectures.

8. Research terms and procedural definitions:
Definition of self-questioning strategy:
Defined by (Mahjoub, Hassanine and Ramadan, 2020, 8) as: "A strategy that includes a set of questions that the learner asks himself during information processing. There are several stages that the learner goes through when using this strategy: pre-learning, learning, and post-learning."
Procedurally, the researcher defines them as: Unguided questions formulated by students themselves, before, during and after the learning process, which help them develop scientific research skills that are measured by the scientific research test prepared by the researcher.
Scientific research skills:"Many general and special skills that must be available in researchers that start by identifying the research problem, then collecting data related to it, and formulating it in a clear way to derive the causes of the problem, and then moving on to propose appropriate solutions to it" (Al-Saadi, 2022, 37).

The current research defines it as: The student's ability in the fourth year to conduct scientific research with high efficiency represented in following the steps of scientific research and scientific research skills that have been placed in the list of skills prepared by the researcher , through what he has gained from the courses of the teacher preparation program in the Faculty of Education and through the directives of the supervisor and providing the research environment that enables him to prepare the research in a sound scientific manner.

"Theoretical Framework"
First: Self-questioning

Self-questioning has several labels, including: self-help strategies, self-planning, self-esteem , self-reflection, and reading prediction. "The self-questioning strategy is one of the most efficient strategies, as it invites the learner to search for specific information by answering questions he directs to himself during learning, thus training his ability to summarize, classify, investigate and extrapolate. It is one of the important strategies in the learning process" (Juma, 2010, 230).

The self-questioning strategy is a metacognition strategy that is concerned with developing the learner's abilities in planning, follow-up and evaluation during their own self-learning. It stimulates, assists and stimulates various thought processes. This strategy is closely related to constructivist theory in the field of learning and education. Constructivist theory is an educational model that focuses on the role of the learner in building their own knowledge through their interaction with educational content and experiences (Al-Ghamdi, 2014, 231).

Self-questioning includes two types of questions : 1- Guided questions: They are the heads of questions that the teacher identifies for the learner, and the student generates a similar answer. 2-Non-directed **questions**: It is the answer formulated by the learner during, before, or after the learning process, so that it helps them to understand the learning material and understand its meaning " (Hakima, 2018, 37).

- The role of the learner and the teacher in the self-questioning strategy:

 The learner has an effective role during the application of this strategy, as he practices mental processes that make him more integrated with the educational situation. As for the teacher, he plays the role of mentor, guide and facilitator.

 The self-questioning strategy focuses heavily on the learner, and the role of the teacher is instructive. Through this strategy, the learner learns by himself without the help of a teacher, relying on his   own abilities and becomes an active and active educational member. A good teacher is one who makes his students gradually dispense with him, and his role is directed and facilitated.

The learner is a planner, observer , and evaluator of his learning style, and the teacher is motivating and encouraging him. One of the consequences of using the self-questioning strategy is to get the learner to focus on deep learning and understanding. Answering the questions that the learner asks themselves requires knowing, understanding, analyzing and perceiving relationships, and simulating students' questions during learning increases their absorption in understanding, which increases their mastery of skills" (Al-Dhufairi, 2021, 37).

Stages of using the self-questioning strategy:
The self-questioning strategy has three stages: planning, monitoring, and evaluation. Each stage has its own questions that the learner must formulate, which are as follows:

" The **first stage** - the **planning stage**: The planning stage is the first stage of using the self-learning strategy, and for planning to be successful, the learner must formulate questions about the content of learning, such as: - What is the problem you are facing? - What should I do ? What do I know about the problem so far? - What information do I have? - How does this information help me with the problem I'm facing? - What is my learning plan? - What is my Plan B?

 Stage2- Monitoring Stage: In this stage, the learner monitors the results of the implementation of what happened in the first stage, and they should formulate questions **such as**: - Did I use my learning plan or strategy? - Do I need a new plan? - Do I need an alternative strategy? - Shall we change my goals? - What is my first goal? - Am I in the right position? - Did I achieve my goal?

 Stage3 – **Calendar**: Here the learner should ask themselves questions **such as**: - What did we do? - What didn't we do? - What are we going to do next? " (Al-Dosari, 2021, 93-94).

Second: Scientific Research:

 Scientific research is one of the best ways for the intellectual and material advancement of nations and peoples, and to the extent of spending on it, the beneficial return to society is high . Therefore, it is natural for universities to pay special attention to it, and to direct their activity to training students to master scientific research methods during their university studies, to enable them to acquire research skills that make them able to add new knowledge to the balance of human thought. **Scientific research is "**a means of study by which a solution to a particular problem can be reached by thoroughly investigating all verifiable evidence to which the specific problem relates or is likely to have a relationship with the problem" (Razzaq, Razzaq & Razzaq, 2020, p. 298).

"Educational research is one of the fields of scientific research;"it follows the steps of the scientific method in research in the same way, procedures and statistical analysis, and differs from it only in the scientific method in any field" (Mishra, 37, 2010).

Research skills include"thinking **and** working styles, work tools, and skills related to life in the world" (3.suto&Eccles 2014,p). The categories of scientific research skills have been numerous, as Shoman, 2013, believes that "the necessary skills that researchers must acquire to make the student discoverable and innovative instead of being a future student, and has observation skills and the ability to quote correctly, write scientifically and summarize." As (Brown, 2017) stressed, "It consists in helping the researcher to choose the appropriate design for the research, how to research the sources of information, choose the research problem, design experiments, and reach a solution to problems."

The importance of educational scientific research: The importance stems from the fact that: "The field of educational research is considered a tool to verify the educational theories inherited from previous generations by asking what is going on about an educational phenomenon that existed and developed" (2012, Upadhyay), and its importance is "in expanding the culture of students and empowering them with the foundations of scientific research in education, andqualifyingthem to deal with educational problems, and to help them read and use the library, and to develop and improve educational curricula continuously to keep pace with the requirements of change in life" (Al-Ghamdi and Qutb, 2020, 106).

Objectives of scientific research: One of the objectives of scientific research is to solve problems, as it seeks the truth, tries to reveal it, identify phenomena and events, identify their causes, and study the mechanism of their occurrence, with the aim of understanding them scientifically, in order to reach scientific results of the studied problem. 2. Discover the unknown and learn about the latest developments in science. 3. Evaluate and evaluate current scientific knowledge through its repeated use on specific problems in accordance with studied controls and procedures. 4-Facing the challenges and developments facing individuals, the establishment or society, searching for their causes, identifying ways to treat them, identifying their effects and thus finding appropriate solutions to them according to the available data and experience. 5- Analyzing the relationships between variables and clarifying the reasons"(Al-Dashli, 2016,36).

Foundations and components of scientific research:
There are many foundations and components of scientific research as stated in Al-Shahrani and Al-Arifi (2022), which are:
1.Define research objectives accurately and clearly, especially in the selection of the topic.
2. Conceptualization, creativity, the realization of thought, talent, familiarity with differentiated research tools, and mastery of scientific research writing techniques.
3. Accuracy of observation and observation of the phenomenon in question, and the work of thought and reflection, which leads to the examination of the variables surrounding the phenomenon, so that the result is the development of laws consistent with the reality of observations and variables.
4. Putting the explanatory hypotheses of the phenomenon to be proven and proven and put them as abstract and objective ideas from which the researcher proceeds, so that they lead him to collect the facts that explain the hypotheses, and thus conduct experiments in their light away from adapting them to what the researcher wants to prove and reach.
5. The ability to collect scientific facts transparently and credibly from various sources and references, classify, classify and scrutinize them accurately, and then analyze them.
6. Conducting the necessary experiments with the aim of obtaining scientific results consistent with the practical reality and the continuity of following up the variables and testing the hypotheses and ensuring their validity.
7. Obtaining the results and testing their validity by examining, comparing and validating their applicability to similar phenomena and problems, and proving the validity of hypotheses.

Steps of Scientific Research"
 Scientific research can only be done by following correct and sound scientific steps, and the methodology of scientific research is found in all universities of the world and in all disciplines, and **these steps are represented in (**the title of the research, the formulation of the research problem, the development of research hypotheses, writing the importance of research, the formulation of research objectives, identifying the research community and sample, knowing the scientific research methods, determining the limits of research, writing previous studies, writing research terms, setting the research structure, ranking sources and references (Mahmoudi, 2019, 89).

"Previous Studies"
1- The study of (Abdul Mughith et al., 2022): The aim of the research was to reveal the effectiveness of using self-organized learning strategies in developing the skills of historical research among students of the History Division of the Faculty of Arabic Language, Al-Azhar University, and the experimental approach was used. As for thetool, it is a test of historical research skills, and the research sample consisted of (30) students,

and one of the most important results: There are statistically significant differences between the average scores of students in the research group in the pre and post application of the historical research skills test at a significance level of (0.05) in favor of the post application, and the results of the impact size came in the historical research skills test (0.98), and the research recommendations were the need to emphasize the development of historical research skills among students of the History Division of the Faculty of Arabic Language, Al-Azhar University.

2- Study (Ataa, 2022): The study aimed to build a training program to develop research skills among graduate students in the faculties of education in the universities of Aden and Lahj. The descriptive survey approach was used, and the tool was a questionnaire. The study sample reached (59) graduate students in the faculties of education in the universities of Aden and Lahj. The study reached results, including: The degree of training needs of the sample members' estimates to develop research skills in all fields and in the tool as a whole, came to a high degree. The field of statistical skills came first, followed by the field of language skills in second place, then the field of academic skills in third place, and finally the field of technological skills in fourth place. Accordingly, the proposed training program was presented.

3-The study (Qubqab and Al-Mukhlafi, 2022): The study aimed to identify the degree of availability of scientific research skills among the students of the Faculty of Education at the University of Saba from the point of view of students and their supervisors. The study followed the descriptive analytical approach, and the tool was a questionnaire consisting of five fields, and the sample consisted of (133) students from the fourth level in the departments of the Faculty of Education, and (22) supervisors who supervised their graduation research, and one of the most important results of the study was: (The degree of availability of research skills in the sample was (low) On the total questionnaire and its sub-fields from the point of view of students and their supervisors; except for the field of research literature, it was with a degree (very little) from the point of view of students, and with a degree (medium) from the point of view of their supervisors. The results also showed statistically significant differences in the estimates of students and their supervisors to the degree of availability of research skills on the total questionnaire, the field of references , and documentation and the absence of statistically significant differences on the other four fields. The results also revealed the existence of statistically significant differences in the sample attributed to the department variable (scientific, humanitarian) on the total questionnaire and its sub-fields, and the absence of statistically significant differences attributed to the gender variable (Male, Female).

 4- Wulandari study (Wulandari, 2022): The study aimed to identify the effectiveness of the use of self-questioning in improving the ability of students with learning difficulties to read comprehension, and used the semi-experimental approach. The research tool was the reading comprehension form and a pre and post measurement. Among the most important results: The emergence of statistically significant differences at the level of significance (0.05) between the experimental and control groups during the post application in favor of the experimental group, and the significance of the impact of the self-questioning strategy in improving reading comprehension among students with learning difficulties.

5- Study (Mohsen, 2021): The study aimed to identify the effectiveness of a training program based on the Pentagon strategy in developing the scientific research skills of female students. The descriptive analytical approach was used. As for the tool, it was a research skills observation card, and the sample (10) female students. The most important results of the research came. There was a statistically significant difference at the level of (0.05) between the average grades of the students of the experimental group in the pre and post applications on the scientific research skills observation card (as a whole), and at each of her skills, the research recommended the need to contain courses in the stages of university education on the application of research to consolidate scientific research skills.

6- **Study (Al-Ajab et al., 2020):** This study aimed to investigate the impact of designing learning materials according to the merger between distance learning methods and the self-questioning strategy on the motivation of learners and their skills in preparing the research plan in the research methods course. The experimental approach was used in a quasi-experimental design, and the study was used as a tool to assess performance andmeasure motivation. The sample consisted of (33) male and female learners enrolled in the first year in technical studies programs at the Faculty of Graduate Studies at the Arabian Gulf University in the Kingdom of Bahrain. Among the results of the study: There are statistically andpractically significant differences between the average of the experimental and control groups in the combined motivation categories, in favor of the experimental group. There are also statistically significant differences between the average of the two groups in the skills of preparing the research plan together for the benefit of the experimental group, and one of its most important recommendations is to employ the integration between distance learning methods and the self-questioning strategy in the design and teaching of research courses.

 7- Study (Al-Mahmoud, 2020): The study aimed to identify the impact of using participatory e-learning and cloud computing strategies in developing scientific research skills for postgraduate students at the Faculty

of Fine Arts. The study followed the experimental approach, and used four tools: a list of research skills, an achievement test, an electronic program that included a course on the origins of scientific research methods, anda performance observation card. The study sample consisted of (30) maleand female students. Among its most important results: There is a statistically significant difference between the average grades of students in the pre and post application of the list of research skills in favor of the post application at the level of (0.05). There is a statistically significant difference between the average grades of students in the pre and post application of the achievement test in favor of the post application at the level of (0.05). There is a statistically significant difference between the average grades of students in the pre and post application of the performance test in the post application in favor of the post application. There is an impact of the use of participatory e-learning and cloud computing strategies in the development of scientific research skills for postgraduate students at the Faculty of Fine Arts – Assiut University at the level of (0.01).

8-The study of Akyurek **& Afacan, 2018)**: The study aimed to identify the problems faced by graduate students when conducting their scientific theses at the Educational Institute in the Central Anatolia region of Turkey, and the study used the descriptive approach. As for the tool, it was interviews, and the sample was (29) doctoral and master's students, and it reached the following results: The existence of a number of problems facing graduate students, perhaps the most important of which is the level of scientific knowledge, issues related to the supervisor, and scientific methodology.

9- Isosomppi & Maunula Study, 2016) : The study aimed to develop the scientific research skills of a sample of students participating in online studies in open universities. The study followed the experimental approach, and the research tool was a training program, and it was applied to a sample of students in open universities. One of the most important results was: beginner students in the first stage of the educational studies of the Open University have little experience of writing scientific theses and research practices, and performance improved after the application of the program.

10- Study of **Subahan et al**. (2012 ,**Subahan et.al):** This study aimed to find out the extent to which a sample of postgraduate students at the University of Kepa Nghsan in Malaysia were able to scientific research skills. The study tool was a questionnaire. The study was applied to a random sample of graduate students . One of the most prominent results of the study was that students have moderate knowledge and competencies to conduct research. The study recommended that despite the good results of the study, it believes that there is a need for more research training for students in order to produce a researcher with high research knowledge and skill.

11- Naz et al. (2011 Naz et.al,) : The study aimed to estimate the level of difficulties faced by postgraduate researchers, and used the descriptive analytical approach. The research tool was a questionnaire as a tool to collect information, while the sample is (70) university graduates and postgraduate students. One of its most prominent results was that students lack a lot of research skills related to the use of electronic research tools, ignorance of statistical tools, and the inability to explain data and reach results after analyzing them. The study also revealed that one of the reasons for the poor research skills of researchers is due to the lack of proper guidance for them. The study recommended: reconsidering the courses taught at the college level, and the need to increase training for students and faculty members on research practice.

Commenting on previous studies:
– The diversity of the approach used in the studies, including those that followed the experimental approach, including the study of (Abdul Mughith et al., 2022), and the study of (Al-Mahmoud, 2020), and the study of Isosompp & Maunula, 2016), and some of them followed the descriptive analytical approach, including the study of (Qubqab and Al-Makhlafi, 2022), and(Mohsen, 2021), and the study of Naz et.al, (2011 Naz et.al,), Akyurek & Afacan, 2018), and some of which used the semi-experimental approach, including the study of Wulandari, 2022), and the study of Wonder and Saleh (2020). The samples and the educational stage in the studies varied, including those who chose the students of the Faculty of Education as in the study of (Abdul Mughith et al., 2022), including those who chose graduate students in the Faculty of Fine Arts and those who applied the study to a sample of graduates and postgraduate studies as in the study of Naz et.al, (2011, Naz et.al,), and the study of Akyurek & Afacan, 2018)), the studies differed in the variant of which adopted scientific research skills as in the study of (Ataa, 2022), and the study of (Qubqab and Al-Makhlafi, 2022), and the study of (Mohsen, 2021), and the study of Isombe and Minal Isosomppi & Maunula, 2016)), and the study of (Al-Mahmoud, 2020, and the study of Subahan et.al), and this is consistent with the current research that adopted scientific research skills, including dealing with Historical research skills, as in the study of (Abdul Muhith et al., 2022), and previous studies differed in the tool used, including the use of the historical research skills test as in the study of (Abdul Muhith et al., 2022), including the use of the questionnaire as in the study of (Ataa, 2022), the study of Qabqab and Al-Mukhaffi (2022), the Naz et.al study (2011 Naz.al,), and the study of Subahan et.al (2012, (Subahan et.al, from which he used the research skills observation card as in the study of (Mohsen .2021), including the list of performance evaluation and the motivation scale as in the study of (Wonder and Saleh, 2020), and an achievement test as in the study of (Al-Mahmoud, 2020),

andinterviews as in the study of Akyurek & Afacan, 2018) . The researcher benefited from the previous studies in the design of research through which he identified the scientific research skills necessary for the students of the Faculty of Education and the appropriate for the current research, the steps of the self-questionation strategy, and how to choose the test questions.

Research Methodology: The quasi-experimental method was followed, which is defined as "the method that is based mainly on the study of human phenomena as they are in nature without man interfering with them, or is defined as knowing the relationship between two variables as it is in reality without controlling the variables. (Deacon and Milad , 2022, 34), and was used in the current research to reveal the effectiveness of the self-questioning strategy in the development of scientific research skills, and the selection of experimental design with experimental and control groups.

The **research community and its sample:** The research community consists of all fourth-year students in the Faculty of Education at Israa University in the academic year (2023, 2024), and the research sample consisted of (80) students, divided equally into two groups. The first group was the experimental group that learned according to the self-questioning strategy and numbered (40) students, and the second was an officer who learned the same way and numbered (40) students.

Research tools, their validity and stability: -

- **Thelectures prepared according to the self-questioning strategy, were prepared according to the following steps:**
- Determining the general objective of the lectures: Determining the effectiveness of the self-questioning strategy in developing the scientific research skills of the fourth-year students in the Faculty of Education.
- Choosing the content of lectures: from the course of scientific research methods for students of the fourth year.
- Determining the scientific research skills to be developed by students in the Faculty of Education: Through reviewing a number of studies that dealt with scientific research skills, a list of scientific research skills was prepared.
- Preparing lectures according to the self-questioning strategy: The lectures were prepared by setting educational goals in each lesson, and applying the steps of the self-questioning strategy.
- Exploratory experimentation of lectures prepared according to the self-questioning strategy: A model of lectures was presented to a group of (7) arbitrators with experience and competence. The modifications were the need to clarify the steps of the self-questioning strategy during preparation more clearly by numbering each step, and adding questions to the interim evaluation during the lecture. The required modifications were made to the lectures prepared according to the self-questioning strategy based on the observations of the arbitrators, then they became ready for the exploratory experiment, through which it is possible to identify the time required to implement each lecture, and to identify the difficulties that can hinder the progress of implementation to be dealt with when implementing the final experiment. Then, exploratory experimentation was conducted on a sample of fourth-year students in the Faculty of Education, which is outside the basic research sample, and their number (35) students. Problems were avoided during the implementation of the lectures, including the problem of adjusting the time and coordinating the steps of the strategy to determine the time required for each step, and thus the lectures became ready for final application.

- **Scientific research skills.**

- Determining the purpose of the list: Determining the scientific research skills that must be available to students of the fourth year in the Faculty of Education at Israa University.

- Identify the main skills of the list: by reviewing previous studies and research related to the research topic, which focused on scientific research skills and ways to develop them, and through the scientific review of the curriculum of scientific research methods in the Faculty of Education, and experts and specialists in the field of curricula, teaching methods and methods of scientific research.

- Preparing the list of scientific research skills in their initial form: The skills to be developed by the fourth-year students in the Faculty of Education were identified and reached (8) main skills, which are: the skill of writing and drafting the title of the research, the skill of writing the introduction to the research, the skill of identifying and formulating the research problem, the skill of writing the main question and the subquestions of the research, the skill of writing research assignments, the skill of determining the objectives of the research, the skill of determining the importance of the research, the skill of writing research terms.

- Setting the list: The list was set using the veracity of the arbitrators by presenting it to a group of experienced and specialized arbitrators, and asking them to express an opinion on the list, in terms of the importance of the proposed skills, their scientific and linguistic validity and the degree to which they covered the necessary scientific research skills, and in light of the arbitrators' observations, the list was reviewed and drafted in its final form.

- Preparing the list in its final form: After making the amendments proposed by the arbitrators, which are separating the skill of the sub-questions from the main question of the research, and adding the skill of determining the research methodology, the final list of scientific research skills includes (10) main skills as follows:

Table (1): List of scientific research skills

Seq.	Scientific research skills.
1	The skill of writing and formulating the title of the research
2	The skill of writing the introduction to the research
3	Research problem
4	The skill of writing the main question of the research
5	The skill of writing sub-questions for research
6	The skill of writing research assignments
7	Setting research objectives
8	The skill of determining the importance of research
9	The skill of defining the research methodology
10	The skill of typing search terms

– Scientific research skills test:
The following steps were followed to prepare the scientific research skills test:
- Determining the purpose of the test: The test aims to measure the scientific research skills possessed by the fourth-year students in the Faculty of Education at Israa University through the lectures given in the Scientific Research Methods course.
- Preparing a table of test specifications: In order to ensure that the test measures the scientific research skills to be developed by the fourth-year students, by relying on the list of previous scientific research skills and turning them into questions.
- Determining the type of test questions: After reviewing how to prepare and build the test for the undergraduate stage and in the subject of scientific research methods in particular, the type of essay questions was adopted due to their suitability for the nature of the topic, and being able to measure the skills of scientific research that require explanation and clarification.
- Preparation of the test in its initial form: The initial image of the test was prepared by developing an idea for educational research and developing a set of questions related to it, which is each of the scientific research skills that were placed in the list of previous skills and turned into a question in which explanation and clarification are required, as the number of test questions reached (10) questions from the style of essay questions.
- The scores for each skill are distributed according to the total score of the test (100): **(10)** scores **for each question**.
- Formulation of scientific research skills test questions: The following were taken into account when formulating the scientific research skills test items, which numbered (10) questions: (Linguistically sound, scientifically correct, clear and free of ambiguity, including the list of scientific research skills, suitable for the level of fourth-year students in the Faculty of Education).

"The Validity of Scientific Research Skills Test"

Validity of the content: To ensure the validity of the content of the test, it was presented in its initial form with the list of scientific research skills to a group of (7) competent and experienced arbitrators. Based on their suggestions, the required amendments were made to the wording of some test questions, including how the idea of educational research was put forward, and how to transform it according to the methodology of scientific research into methodological steps. \The **exploratory experiment of the test:** After the completion of the preparation of the test, the test was applied in its final form to a survey sample of fourth-year students in the Faculty of Education from outside the research sample consisting of (35) students, and then the results were analyzed, and the goal of this application is to verify the following:
- Internal consistency of the test:
- Calculate the reliability of the scientific research skills test.
- Calculate the difficulty coefficient for the scientific research skills test questions.
- Determine the discrimination coefficient of the scientific research skills test questions.
- Determine the time required to answer the questions of the scientific research skills test.
-

Validity of internal consistency to test scientific research skills:
The internal consistency coefficients were calculated according to the Pearson coefficient for testing scientific research skills by calculating the correlation coefficient of each of the test questions with the total score for testing scientific research skills using the Pearson coefficient and the following table shows this:

Table (2): Correlation coefficient between each of the test questions and the total score of the scientific research skills test.

Question #	Correlation coefficient	Significance level

1	353*	Significant at P ≤ 0.01
2	353*	Significant at P ≤ 0.01
3	369	Significant at P ≤ 0.01
4	446	Significant at P ≤ 0.01
5	461	Significant at P ≤ 0.01
6	590	Significant at P ≤ 0.01
7	412.	Significant at P ≤ 0.01
8	378.	Significant at P ≤ 0.01
9	662	Significant at P ≤ 0.01
10	601	Significant at P ≤ 0.01

* *Table at a degree of freedom (34) and at a level of significance (0.01) = 0.449

It is clear from the previous table that the coefficients of the correlation of the questions to the total score of the test are statistically significant at the level of significance (0.01), which indicates the internal consistency of the dimensions of the test questions.

The Reliability of the Scientific Research Skills Test"

Test stability was calculated by the internal consistency method using the Coder-Richardson equation 20and the following table shows the test stability coefficient.

Table (3): Stability of the scientific research skills test questions

Questions	Stability coefficient
10	0.87

It is clear from the previous table that the test has a high degree of stability, which reassures its use in the basic experiment of research.

• Difficulty coefficient for scientific research skills test questions:

It is measured by the percentage of those who answered the question incorrectly, and the aim was to calculate the degree of difficulty of the questions

The test is to delete questions whose difficulty score is less than (0.20) or more than (0.80), and the following table shows the difficulty coefficient of the scientific research skills test questions.

Table (4): Difficulty coefficient for scientific research skills test questions

Question	Difficulty index
1	0.53.
2	0.63
3	0.69
4	0.56
5	0.44
6	0.38
7	0.75
8	0.41
9	0.66.
10	0.47

It is clear from the previous table that the difficulty coefficients ranged between (0.38- 0.75), which are acceptable coefficients for applying the test to the basic research sample.

• Distinction coefficient for scientific research skills test questions:

It means the ability to distinguish between students in terms of individual differences between them, and their ability to distinguish between the upper and lower categories. The aim of calculating the discrimination coefficient for the test questions is to delete the questions whose discrimination coefficient is less than (0.20) because they are considered a weak question. The following table shows the discrimination coefficient for the test questions.

Table (5): Discrimination coefficient for scientific research skills test questions

Question	Discrimination index
1	0.44
2	0.33
3	0.56

4	0.41
5	0.44
6	0.78
7	0.67
8	0.56
9	0.33
10	0.67

It is clear from the previous table that the discrimination coefficients ranged between (0.32- 0.79), which are acceptable coefficients for applying the test to the basic research sample.

• **Time required to answer the items of the scientific research skills test:**
When applying to the survey sample, the time was left open during the application to the survey sample students, then the time taken by the first five students and the last five students was recorded, then the average time was calculated using the following equation:
Average time= Total time in minutes/ number of students, with the addition of five minutes to read the instructions, and prepare to answer and respond to inquiries, thus determining the total time to apply the test, which is (90) minutes, that is, an hour and a half.

The research procedures:
Fourth: Equivalence of the two research groups:
The equivalence of the experimental and control groups was adjusted by applying the pre-test of scientific research skills to the experimental and control groups, before starting the implementation of the experiment, and the arithmetic averages, standard deviations, and finding the value of (T) two independent samples were calculated to verify the equivalence of the two research groups, and the following table shows the results:

Table(6): Equivalence of the experimental and control groups in the pre-testing of scientific research skills

Variable	Pre-test	Number	Arithmetic mean	Standard Deviation	T value	P-value
Scientific research skills.	Experimental group	40	63.	42	522	0.586
	Control group	40	60	3.07		

It is clear from the table that the value of (T) in the total score of the test is greater than 0.05, and this means that there are no statistically significant differences between the mean scores of the experimental and control groups in the pre-test application of the scientific research skills test, and thus the equivalence of the two groups.
Application of the **post-research skills test:** After completing the application of the lectures prepared according to the self-questioning strategy to the experimental group, and giving the same lectures to the students of the control group according to the method used, the test was applied remotely to the experimental and control groups.

"Statistical Analysis
In order to process the data statistically, the statistical program (spss) was used to analyze the data using the computer, where the arithmetic averages and standard deviations were calculated, and the Independent sample was tested. -test, calculate the value of eta, and the size of the impact according to evidence of its indicators.

Presentation, analysis and discussion of the results:
– **The answer to the first question:**
The first question states: What is the effectiveness of the self-questioning strategy in developing scientific research skills among students of the Faculty of Education at Israa University?
To answer the first question, the size of the impact was calculated according to the self-questioning strategy in the development of scientific research skills using the following equation (Muhammad and Abdul Azim, 2012, 430)
$* * */ * * * + * *   2 * * =$
The Eta square expresses the ratio of the total variation in the dependent variable that can be traced back to =
η where 2 is the independent variable.
T2=Calculated T-value when using the T-test**.**
= df stands for degrees of freedom and is equal to N1 + N2 **-2.**
The following table shows the magnitude of the impact

Table (7): The proposed reference table to determine the levels of impact size for each of the measures of impact size

effect size	The Used Tool:

Large	Moderate	Small	
0.14	0.06	0.01	$^2\eta$
0.8	0.5	0.2	D

$^2\eta$ Table (8): Ita square value

Scaling up through	d value	The value of the ETA box	T(value)	Testing
Large	1.48	2.0	7	Scientific research skills.

It is clear from the previous table that the size of the impact was large, and this confirms the effectiveness of the self-questioning strategy in the development of scientific research skills among fourth-year students in the Faculty of Education, as it is clear (Reda, 2003, 672) "If the value of the ETA square = 0.16 and above, this indicates the size of a large impact.

The result of the second question and its discussion: Are there statistically significant differences between the average scores of the students of the experimental group in the pre and post applications to test the skills of scientific research?

To answer the question, the first hypothesis of the research hypothesis was verified by using the (T) test for correlated samples, as the differences between the mean scores of the students of the experimental group on the total score were calculated to test the skills of scientific research in the pre and post applications as shown in Table (9).

Table (9): (t-test) values to indicate the differences between the mean scores of the experimental group students in the pre and post applications of the scientific research skills test

Skill	Experimental group	SAMPLE	Arithmetic mean	Standard Deviation	T value	Degrees of freedom	P-value	Decision
Formulation of the title	Pre-assessment	40	925	4.02	923	38	0.000	D in favor of the post application
	Post-application		821	0.98				
Introduction	Pre-assessment	40	932	4.02	345	38	0.000	D in favor of the post application
	Post-application		342	1.70				
Formulation of the Research Problem	Pre-assessment	40	356	4.01	234	38	0.000	D in favor of the post application
	Post-application		823.	0.89				
Write the main research question	Pre-assessment	40	987	4.02	.789	38	0.000	D in favor of the post application
	Post-application		934	1.02				
Write research sub-questions	Pre-assessment	40	6.971	4.01	943	38	0.000	D in favor of the post application
	Post-application		875	17.2				
hypotheses of the study :	Pre-assessment	40	861.	4.03	6.894	38	0.000	D in favor of the post application
	Post-application		342	2.23				
Identify Research Objectives	Pre-assessment	40	145	4.04	453	38	0.000	D in favor of the post application
	Post-application		8.123	1.49				
The Significance of the Research:	Pre-application	40	165	4.05	689	38	0.000	D in favor of the post application
	Post-application		982	1.35				
A- Determining the research method	Pre-application	40	.678	4.01	841	38	0.000	D in favor of the post application
	Post-application		987	1.44				
Search Terms	Pre-application	40	612	4.05	0.892	38	0.000	D in favor of the post application
	Post-application		876	1.54				
Total	Pre-application	40	632!	4.02	.003	38	0.000	D in favor of the post application
	Post-application		83-105	1.48				

It is noted from the previous table that the probability values of the total score for the test of scientific research skills and each skill separately are smaller than its default level of significance (0.05). This indicates that there are statistically significant differences between the average scores of the students of the experimental group on the test of scientific research skills in favor of dimensional application, and therefore we reject the zero hypothesis and accept the alternative hypothesis for it, which says: There are statistically significant differences between the average scores of the students of the experimental group in the pre and post applications to test scientific research skills in favor of dimensional application.

Discussion of the result of the first hypothesis:

The result of the hypothesis shows the effectiveness of the self-questioning strategy in developing the scientific research skills of students by indicating the differences between the averages of the degrees of the students of the experimental group in favor of the dimensional application, and in each skill separately. The results can be explained by the following points:

- Using a self-questioning strategy helped the student mentally process each step of scientific research from formulating the title to making suggestions.
- The self-questioning strategy helped the student to directly understand, deduce, think critically and create, which made the knowledge specific and clear to the students.
- The strategy helped to consolidate the steps in the methodology of scientific research and how to prepare, formulate and arrange them in long-term memory by going through three stages that focus heavily on the idea, so that the student must identify the most important ideas and put forward new ideas. All this will enter into the learner's knowledge structure and communicate with him well, which allows to build new knowledge on it, and thus the knowledge structure is coherent and meaningful.

The results of the **study(Al-Ajab et al., 2020)** support the current result, which proved that there are statistically significant differences between the averages of the students of the experimental group in the pre and post applications of the performance development card in favor of the post application, attributed to the positive impact of the self-questioning strategy in the research methods course of the experimental group.

The **result of** the second **question** and its **discussion:** Are there statistically significant differences between the average scores of the experimental group and the control group in the post-application of the scientific research skills test?

To answer this question, the second hypothesis of the research was tested through the use of the (T) test for independent samples, as the differences between the mean scores of the students of the experimental group and the control group on the total score were calculated to test the skills of scientific research and in each skill separately in the post application as shown in Table (10).

Table (10): (t-test) values to indicate the differences between the mean scores of the experimental group and the control group in the post-application of the scientific research skills test and in each skill separately

Skill	Group	Arithmetic mean	Standard Deviation	T value	Degrees of freedom	P-value	Decision
Formulation of the title	Control group	6.123	3.04	993.	78	0.000	D in favor of the post application
	Experimental group	821	0.98				
Introduction	Control group	.789	4.02	265	78	0.000	D in favor of the post application
	Experimental group	342	1.70				
"Formulation of the Research Problem	Control group	.678	3.01	6.214	78	0.000	D in favor of the post application
	Experimental group	823.	0.89				
Write the main research question	Control group	6.784	3.15	759	78	0.000	D in favor of the post application
	Experimental group	934	1.02				
Write research sub-questions	Control group	234	12.3	.843	78	0.000	D in favor of the post application
	Experimental group	875	17.2				
hypotheses of the study :	Control group	.678	3.34	7.894	78	0.000	D in favor of the post application
	Experimental group	342	2.23				
Identify Research Objectives	Control group	6.765	3.32	352.	78	0.000	D in favor of the post application
	Experimental group	8.123	1.49				
The Significance of the Research:	Control group	5.713	3.53	5.876	78	0.000	D in favor of the post application
	Experimental group	982	1.35				
A- Determining the research method	Control group	.678	3.19	164	78	0.000	D in favor of the post application
	Experimental group	987	1.44				

Search Terms	Control group	.721	2.79	6.213	78	0.000	D in favor of the post application
	Experimental group	876	1.54				
Total	Control group	163	4.02	657	78	0.000	D in favor of the post application
	Experimental group	83-105	3-251				

It is noted from the previous table that the probability values of the total score for the test of scientific research skills and for each skill separately are smaller than its hypothetical significance level (0.05). This indicates that there are statistically significant differences between the average scores of the students of the experimental group and the control group in the post-application of the scientific research skills test for the benefit of the experimental group. Therefore, we reject the zero hypothesis and accept the alternative hypothesis for it, which says: There are statistically significant differences between the average scores of the students of the experimental group and the control group in the post-application of the scientific research skills test for the benefit of the experimental group.

MDiscuss the result of the second hypothesis:
We note the superiority of the experimental group that learned according to self-questioning over the control group that learned by the method used. This can be explained by the following:
This can be interpreted to mean that the self-questioning strategy:
• It allows each student to ask themselves and raise their own ideas about scientific research skills and how to formulate each step of the scientific research methodology.
• It contributes to increasing reading comprehension and making them able to think critically by expressing opinions that express the reader's personality towards a specific issue or idea put forward in educational research and the ability to make a judgment that expresses understanding of the content.
• It provides activities that suit each step of scientific research, namely the pre-reading stage, the reading stage and the post-reading stage, which put students in a state of constant questioning and continuous mental activity.
• It creates an emotional structure and a cognitive motivation. When the learner starts using questions, he/she is more able to analyze critically and is more able to deduce and create.
• It stimulates the learner's motivation and curiosity in reaching the correct formulation of the steps of scientific research and understanding them well.
• It helps the learner to self-assess, by using the self-questioning steps control form, and providing a summary of the topic or idea, and thus there is self-control, awareness, and self-monitoring of the learning process.
• It provides the opportunity to revisit the way of thinking and then observe the problems posed from different angles and raise the level of understanding and thinking to become critical and creative.
This is confirmed by **(Al-Hilwani, 2003, 13)** that self-questioning helps to reach positive results in terms of retrieving information, using it in other reading situations, and makes students self-reliant in building meaning by discovering it.
This result is consistent with the study of **(Al-Ajab et al., 2020)**, which confirmed the existence of differences between the average scores of the students of the experimental group and the average scores of the students of the control group in the post-application of the performance development card in favor of the experimental group.

Research Proposals:
1. Encourage faculty members at universities to teach their students how to use the self-questioning strategy and its usefulness in developing scientific research skills.
2. The need to review the teacher preparation programs in the Faculty of Education in its various departments and to consider the courses of developing the methodology of scientific research among students and linking them to the experiences of the learner and his professional future to be a competent researcher.
3. Holding continuous training courses for faculty members in universities on modern teaching methods that can be used with university students, including a self-questioning strategy.
4. Benefiting from the research tool, which is to test the skills of scientific research and apply it to students at other educational stages, including graduate students.
5. Studying the effectiveness of various other strategies in developing scientific research skills that depend on the student's self-research.
6. Conducting further research and studies on the self-questioning strategy and developing the methods and programs necessary for its use in line with the nature of scientific knowledge and the objectives of scientific research.
7. Reviewing the methods of teaching scientific research curricula to students at the university level through the use of methods and strategies commensurate with the presentation of scientific content and its objectives.

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