The Effect of Instructional Design According to Experiential Learning Strategies for the First Intermediate Grade Students in Preparing Information for Science Subject

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Abstract:

The aim of the research is to identify the effect of of instructional design according to experiential learning strategies for the first intermediate grade students in preparing information for science subject.To achieve the goal of the research, the researcher adopted the experimental design with partial control, as the research sample consisted of (36) female students from the first intermediate grade, with (18) students in the experimental group who studied according to the instructional design of experiential learning strategies, and (18) students in the control group, which was studied according to the usual method, was made equivalence between the two groups in some variables (age, intelligence, previous information, information processing for science subject). The researcher also prepared the research tool represented in the information processing scale for the science subject, and its psychometric properties were verified. The researcher applied the scale to the two research groups, and the results showed the superiority of the students of the experimental group over the students of the control group in the scale of information processing for the subject of science.

Key Words:instructional design,experiential learning strategies,in preparing information.

Search definition

First: The research problem: the educational process is closely related to learning theories and strategies that direct its course and determine its different types of activities.This calls for following up on developments in this field because of their importance in developing the education process,

and despite the developments imposed by global trends in the educational field, most of our educational and teaching institutions still depend on memorization and showing in teaching science, and that most science teachers are interested in the theoretical aspect, Without paying attention to the practical aspect, and that the use of the laboratory is almost neglected, as the researcher considers that the lack of adoption of effective modern teaching methods may lead to a low level of information processing for students and thus a low scientific level for them. And that this reality does not provide the opportunity for students to practice most of the activities themselves, and this is what the researcher saw through her observations of teachers and female teachers of science in middle schools through her work as teachers of practical education for fourth-grade students in the College of Education and during her visit to schools with her students. Therefore, she tried to identify the reasons for the low information processing among first-grade intermediate students from the point of view of male and female science teachers who study science in middle schools, and through their interview and discussion with them, she found the following reasons : (The lack of adoption of modern teaching methods, the vocabulary density of the science subject book, the lack of the necessary capabilities for practical teaching and the lack of materials, tools and teaching aids by not equipping laboratories with these materials).

These reasons represent a bridge linking knowledge to performance, and neglecting them in science teaching leads to poor information processing among students, and this makes the information and facts that they study may be subject to forgetting. Therefore, the researcher conducted a study that dealt with an educational design according to experiential learning strategies, because she believed that it might have an impact on the processing of information for first-grade intermediate students.it also hopes that this educational design will be a good gesture in the development of science teaching, and that the concerned authorities in the Ministry of Education will benefit from it to employ these educational strategies in teaching science. In light of the above, the research problem can be formulated in the following question:

What is the effect of an educational design according to the experiential learning strategies of first-grade intermediate students in preparing information for science subject ?

Second: The importance of the research: The modern view of education is represented as a dynamic process that aims to provide the appropriate environment that helps to form the human personality of the members of society, and enables them to acquire social qualities through balanced growth physically, mentally, psychologically, and socially according to the ideological framework of society, and that the school is the tool to achieve the goals of education (Al-Heila, 1999, p. 95), so the researcher believes that it is necessary to develop methods of science teaching in general and biology in particular, and adopting modern educational strategies based on the needs of students and their educational and interactive nature to participate effectively in the educational process As well as adopting educational designs emanating from educational theories that emphasize the role of the student in understanding information. As scholars of instructional design see that the educational process is organized for the actions that the teacher takes in the classroom, especially when he presents the study material and his sequence in its explanation, and they see that the educational process is, in essence, a process of organizing the content of the study material, which often takes the form of a hierarchy (Darwaza, 2000, p. .35). Many studies have confirmed the impact of instructional design on the educational process, and among these studies, (Al-Afoun&Al-Shiabawi ,2018) study, which indicates the positive impact of instructional design on the strategies of divergent thinking As it led to raising the level of achievement for High school students in physics .

Experience-based learning, or what educators call experiential learning, is one of the trends used in education programs around the world, especially those that aim to provide a realistic learning experience (Azrina& Mona, 2018, p. 3). Saadeh (2014) stated that experiential learning basically means learning and self-development that is accomplished and achieved through experience and personal participation of the individual rather than saying that it is teaching that is received within a stereotypical group, or through observation, listening, or theoretical study, or through Virtual systems, or any kind of different skills or knowledge (Saada, 2014, .27). There are many studies that confirm the importance of experiential learning in teaching science, including the study of (Al-Ghamdi and Al-Jar Allah,2020, p.937) Which aimed to identify the effectiveness of using the experiential learning method in developing the creative thinking skills of primary school students through science teaching. The results showed the

superiority of the experimental group over the control group in the post application of the creative thinking skills scale.

Therefore, the researcher believes that adopting experiential learning strategies in teaching may have an impact on acquiring information processing methods, as the researcher noticed, through her modest experience, that students whose thinking when learning biology is to memorize and remember information, cannot realize this information and biological facts in a meaningful way, and the weak level of knowledge in our schools, which is due to the poor processing of biological information and its cognitive representation among students, is one of the educational problems that represent a major obstacle to achieving and achieving educational goals.

The level of information processing is determined in the way the student follows when studying some scientific concepts. It may be a process of repetition and retrieval of a task without a superficial meaning or realizing its meaning and finding similarities between it and another task or trying to link two or more tasks between them as a correlation in a context of deep meaning. So it takes different levels, starting with the seen level and ending with the abstract level (Ramadan, 2005, p.188). Because of the importance of information processing methods, many studies and research have been conducted that dealt with this variable, including the study of Tuhma (2018, p.), which aimed to identify the effectiveness of the John Zahorek model in processing biological information for students of the fourth scientific grade, and the results of the study showed the existence of a statistically significant difference in favor of the experimental group in each method of biological information processing.

In light of the foregoing, the importance of this research lies in the following :

1-Instructional design according to experiential learning strategies, and knowing its effect on preparing information for first-year intermediate students in science.

2-The educational design may help alignment with the research variable (information processing).

3-The instructional design deals with a number of strategies that may give an opportunity to present each topic in an interesting way.

4-The research may contribute to focusing on increasing the processing of biological information for female students.

Research Objective: This research aims to:
1-Building an instructional design according to experiential learning strategies.
2-Knowing the effect of instructional design according to experiential learning strategies in processing information for first-year intermediate students in science.

Research hypothesis: For the purpose of verifying the research objective, the following null hypothesis was formulated :
-There is no statistically significant difference at the level (05.0) between the average scores of the experimental group students who study according to the educational design of experiential learning strategies and the average scores of the control group students who study according to the usual method, in the information processing scale for science subject.

Research limits: The research is limited to the following limits :
1-**Time limit**: the second course of the academic year 2021-2022.
2-**Spatial limit**: one of the government day schools affiliated to the Baghdad Education Directorate / Al-Rusafa /3
3-**The human limi**t: first-grade middle school students in the General Directorate of Education in Baghdad / Al-Rusafa /3
4**-Knowledge limit:** The second part of the science book for the first intermediate grade, which is specialized in biology, 2nd , for the year 2018, which is scheduled to be taught for the academic year 2021-2022.

Define terms;
Instructional design: defined by :
1-Al-Zind (2004): The sum of the activities and procedures that ensure planning the educational situation within specific goals linked to a time-limit and calculated and measurable steps that are drawn up and implemented individually or collectively with a short-term or comprehensive long-term educational situation that achieves specific calculated results or results with broad objective dimensions. It is considered a way to reduce effort, time and cost to reach the best types of product (Al-Zind, 2004, p. 38).

The researcher adopted a theoretical definition of Al-Zind (2004)

Experiential learning: defined by :-
1- Qualters (2010): Learning that helps students to translate the knowledge they gain in the classroom into meaningful learning for their future, a unique form of teaching science that includes reflection, collaboration and assessment (Qualters, 2010, p.95)
The researcher adopted the definition of (Qualters, 2010) as a theoretical definition

-Information processing: defined by :
1-Schmeck (1983): it is the process that includes organizing and dealing with a group of activities inside the brain that individuals prefer to perform, and these processes range from the depth in which this information is processed to the superficial (Schmeck, 1983, p.221)
The researcher adopted Schmeck (1983) a theoretical definition

Procedural definition: a cognitive process that includes the methods of the students of the research sample in the first intermediate grade to deal with information in terms of analyzing it, organizing it and integrating it with its cognitive structures,It reflects the performance of the student on the scale of information processing, which was prepared in this research, represented by the final score obtained by the student in the scale of information processing.

Theoretical background

Topic one: Experiential learning

1-**The concept of experiential learning**: Most of the efforts of educators who adopted experiential learning in teaching were related to the higher age stages such as secondary education, university education, and adult education, because the scientific experiments that were based on those educational stages were distinguished with positive results in favor of experiential learning(Saadeh, 2014 , P. 43). The concept of experiential learning has been addressed by many experts in recent years, as Kolb mentioned that experiential learning is a process in which knowledge is formed through the transformation of experience (Kolb & Kolb, 2009, p.44). McKeachie (2002) also pointed out that experiential learning represents a wide range of educational experiences such as community service, field work, training groups, workshops, internships, and

cooperative education that link work in the fields of industry and business with university research learning (McKeachie, 2002, p. .24)

2-**Philosophy of experiential learning and its principles**: Experiential learning is based on a mixture of the educational vision of education and teaching according to the empirical philosophy and the constructivist philosophy. The philosophy of experiential learning seeks educational classes rich with methodological experiences that represent the real world experiences in light of various learning outcomes in which students play a decisive role in determining what educational experiences are appropriate for them (Sarah et al., 2018, p. 1150), and experiential learning depends on a large scale. In learning management practice research for over 35 years. John Dewey is considered the father of the philosophy of learning by experience, as well as a logical development of the work of many scholars, most notably Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire, and Carl Rogers,experiential learning theory provides an orientation for understanding learning and teaching as two life-long processes, through a set of competencies that describe work requirements and how to reconcile them with educational goals in ways of learning and teaching based on experience and expertise. The theory emphasizes the role of formal education in the lifelong learning of individuals to use their abilities in their personal, family, professional and social lives. (Kolb, 2011, pp. 4-5).

3-The difference between traditional learning and experiential learning

The most important differences between traditional learning and experimental or experiential learning can be summarized in the diagram below:

Experimental or experiential learning	Traditional learning
Focus on the trainee who does the work himself	Focus on theoretical training
Open and flexible possibilities in knowledge content	Fixed knowledge content
Desirable knowledge, skills and attitudes are developed through experience and expertise	Knowledge, skills, and trends are imparted and explained

Lessons are rarely taught in the traditional or regular way	Teach the lesson regularly
There is no set time, but flexibility remains the basis	Link to a specific time (most of the time)
It depends on the individual and his output in a flexible and changing manner	It provides stable outputs within a large group
Through it, physical activity is trained, drama and simulation games and exercises are conducted, role-playing, educating others, and taking into account hobbies and leisure.	Through it, electronic submissions and preparations (PowerPoint), the delivery system and chalk - or the blackboard and pen -, reading, attending lectures, studying for the exam, observation, planning, and theoretical and traditional work are done

Chart (1) the difference between traditional learning and experiential learning. (Al-Ghamdi and Al-Jar Allah, 2020, p. 943)

4-**Kolb's theory of experiential learning**: It dealt with Kolb's theory, which he expressed by saying that learning is an integrative approach between the various research directions in cognitive growth and cognitive methods, and its result is a model of learning processes that correspond to the structure of human knowledge and the stages of growth that the individual goes through. The theory is based on the quadruple learning cycle based on action, reflective thinking, practice experience, and abstraction, and is a useful framework for designing and implementing education administration programs in higher education, training and administrative development (Kolb & Kolb, 2009, p.42)

De Ciantis and Kirton (1996) mentioned in Zagloul (2018, pp. 183-184)) indicate that Kolb's experiential learning model is the most well-known model for managing a learning situation, which is the basis for experimental and experiential learning, as Kolb sees learning as "the process that Knowledge and skills are acquired through interaction with experience or trail ." He also sees that experiential learning is a dynamic process that adapts the individual to the knowledge and skills he previously acquired with the situations that he is going through in the

surrounding environment and the situations of professional and practical life, and like any scientific theory, Kolb's theory of experimental learning was built Experimental based on six hypotheses according to Kolb and Kolb (2005), as indicated in (Jaafour and Terzolt, 2013, pp. 202-203), which are :
-It is preferable to view learning as a process rather than in terms of results, therefore, in order to improve learning, the focus should be on the learning process rather than the results, and this process contains feedback that highlights the effectiveness of learning efforts.
-All experiential learning are re-learning and learning is easier through treatments that discover students' ideas and beliefs about the subject of learning, and seek to develop and address them to enable students to integrate them with new ideas and information on the subject.
-Learning seeks to resolve the contradiction between the different methods of the process of adaptation (compatibility) with the world, as contradiction, difference and rejection are the main drivers of learning processes.
-Learning is a comprehensive process of adaptation (compatibility) with the world. It is not only the result of knowledge, but also includes the integration of individual activities (thinking, feeling, cognition, behavior)
-Learning is the product of harmonious exchanges between the person and the environment.
-Learning is a knowledge-building process. Experiential learning theory is a theory for the formulation or construction of social knowledge, and then it can be assimilated into the components of the student's personality.

Learning Strategies According to Experiential Learning Theory:
Saada mentioned (2014, p. 159) that there are (13) strategies for experiential learning, which are: Robin's table, push and pull, look before you hear, the attractiveness of abstraction from top to bottom, one concept with several applications, experience in subtle things then small and big, Building in Failure, Impossible, Mission, Showing the Method, Designing a Quick Student, Building and Maintaining Confidence, and the Three Bears.

The researcher has adopted four experiential learning strategies in this research: a table for Robin, the three bears, look before you hear, and building and maintaining confidence.

5-Applications of experiential learning strategies in the field of teaching:

Jaafour and Terzolt mentioned, (2013, pp. 212-213) There are a number of applications for experiential learning;

-Learning is more effective, easy and sustainable if the presentation or presentation of information is consistent with the student's learning style.

-Individuals differentiate in their reception of information on a continuum between reliance on direct sensory experiences, and indirect conceptual abstraction.

-The fact that individuals learn direct sensory experiences better through emotional awareness of what arises from these direct experiences based on direct contact with others and represent their experiences.

-Conceptual abstraction individuals learn better through reasoning and logical analysis of the ideas, knowledge and information they receive.

-Observation and reflection learn of individuals better through follow-up learning based on the search for meanings and connotations and the multiplicity of visions and dimensions.

-The learning of the actual experimental members is better through learning by working on activating the ideas and making them work and drawing conclusions about their credibility on the ground.

-Any curriculum can be adapted to match it and the requirements of different students' learning style through the presentation of information and strategies for processing it.

-Teachers or parents take into account the main distinctive learning styles of their students or children during their presentation of information, making learning more effective and lasting.

6-The role of teacher and student in experiential learning:

First: The role of the teacher: The experimental teacher plays the role of a guide, providing opportunities for his students to make mistakes, to learn from them and remember them for the rest of their lives. Such a procedure gives the students freedom to conduct tests and experiment, for the purpose of discovering solutions to the problems they face, in addition, this will lead to the teacher providing his students with resources and information when they are unable to do so, thus enabling him to maintain their motivation and maintain their advanced levels of education.

Second: The Student's Role: Experiential learning gives students sufficient freedom in the classroom as long as it shows clear progress in the educational process. Students are also likely to need to engage in so-called trial and error groups when completing their assignments. At the same time, students should realize that the problem-solving process becomes very important when they have learned well about the content of the course.(Mohammed et al., 2021, p. 207)

Topic Two: information processing

1-**Information processing theory**: Information processing is one of the directions of cognitive psychology, which assumes that mental abilities are dynamic capabilities rather than structural ones, as was popularized in the direction of factor analysis, and human beings are viewed as a rational creature that thinks, searches for information and is equipped with it (Abu Hatab, 1990, p. 149), and the theory of information processing presented by Claude Shannon (1949) and referred to by Habib (1996, p. 86), as it is based on quantifying the information received by the individual and how it can be processed while it is inside the mind, and Shannon sees that there is an inverse correlation between The information provided and the concept of uncertainty, and that the individual's ability to receive information depends not only on the information or the stimulus presented to him at the same moment, but also on all the alternatives for this stimulus that are not presented to the individual at the present moment.

2-Basic Assumptions of Information Processing Theory

-The flow of information processing inside the brain is the basis for behavior (the student is a complex tool and we try to discover what is happening inside it), and the stimuli that appear in the environment control the behavior.

-The student's sufficiency in processing information is limited, meaning that the student cannot do many things at the same time.

-Mental processes can be inferred by analyzing private data and knowing it by measuring reaction time accurately.

-Remembering a specific situation depends on the complexity of mental processes and responses made to the situation.

-Forming visualizations, schemas, or symbols about the material being imagined that helps in retrieving information.

-Remembering a specific event is the product of information coming from two sources (the trace of the event in the memory store, and the feedback signals in the environment
-The events that appear before or after receiving the stimuli and that are being remembered interfere to recall of these events.
(Al-Hashimi and Al-Dulaimi, 2008, pp. 206-207)

3-Concepts used in processing information :

Al-Zayat (2006 p. 315) mentioned that information processing introduced new concepts taken from the electronic computer language, which are new to psychology, the most important of these concepts are the following :

A**- Input**s: It includes the stimuli that the individual is exposed to or the more general concept (information), where the information is transformed or symbolized in different ways to transform after that into appropriate outputs, and it is similar to the environmental excitation of the organism.

B- **Operations**: a process that takes place between the inputs generated by the stimuli and the resulting behavior outputs, where information is encoded, processed, stored and retrieved when needed, depending on the cognitive structures of what has been learned and acquired.

C- **Outputs**: It means the final result of translating these re-encoded inputs into outputs, similar to the performance of the organism.

4**-Information Processing Models**: There are many information processing models, including: Craik&Lochart (1972), Sckmeck (1977, Gregorc (1979), Entwistle (1981), Dunn's model Dunn & Dunn (1987). (

The researcher has chosen Sckmeck model in information processing methods, because this model is one of the most specialized types of information processing and is linked to educational dimensions, and a special way of processing and dealing with information, as it is linked to preparing for the learning memory test with a full understanding of the elements of the situation that the student deals with according to special methods. . We will discuss the Sckmeck (1977) model in some detail, as follows.

-**Schmeck's model (1977**): Schmeck (1977) sees, as stated in Aldair (2004), that the method of information processing is a specific method

used by the individual consistently in dealing with information and data during different learning situations, regardless of what the learning process requires from him (Aldair, 2004 , p. 159). Al-Sabab stated (2020: 276) that four methods for processing information by students have been reached, categorized into four standards, which are :

A - **Deep processing method**: which relates to the student's abilities to absorb the study material, such as the ability to deduce, critical evaluation, and compare ideas and concepts.

B - Expanded processing method: It refers to the student's ability to link the facts and ideas of the study material to his own experience, and to modify scientific information through personal additions specific to the student, that is, giving examples from their personal experiences.

C - Fact retention method: It refers to the student's ability to store and retrieve academic information effectively.

D- Systematic study: It refers to the student's ability to organize and schedule his time for study, and the way he studies academic subjects

Research Methodology and Procedures

First: Experimental Design:

Since the researcher designed an educational design according to experiential learning strategies, the researcher adopted the experimental design with two groups, one experimental and the other control with a post-test of the information processing scale.

Group	Equivalence	Independent variable	Dependent variable
experimental group	**- chronological age -intelligence- previous - -collection -Information Processing Scale**	**Instructional Design According to Experiential Learning Strategies**	**Information Processing Scale**
Control group		**usual way**	

Chart (2) Experimental Design

Second: Defining the community and the research sample The research community is defined by first-grade middle school students in the General Directorate of Education in Baghdad / Al-Rusafa /3.

In the current research, the sample was intentionally chosen of medium school of Al Tafani for girls among the schools of the research community, due to the school administration and the science school's willingness to cooperate with the researcher in order to complete the research. The research sample included (36) female students, equally divided into the experimental and control groups,

Third : Control procedures

Internal safety of the experimental design:

The equivalence of the two research groups: the divisions were chosen randomly (Divisions D, B) to represent one of them as an experimental group, and the other as a control group, and the equivalence between the two research groups was conducted with some variables related to the research, namely: (chronological age, previous achievement, intelligence, and information processing scale), and it was found that the calculated T-values are smaller than the tabular values at the (0.05) level and the degree of freedom (34), and this indicates that there is no statistically significant difference in these variables, meaning that the two groups are equivalent. Table (1)

Table (1)

The equivalence of the two search groups

	The group	Number of female students	Arithmetic mean	Standard deviation	Degree of freedom	T-value		Significance
						Calculated	Tabular	
chronological age	Experimental	18	153.67	4.27	34	1.21	2.021	Not significant
	Control	18	152.00	3.97				
previous achievement	Experimental	18	96.00	3.16	34	1.37	2.021	Not significant
	Control	18	94.44	3.62				
intelligence	Experimental	18	37.83	5.03	34	0.61	2.021	Not significant
	Control	18	36.83	4.87				
information processing scale	Experimental	18	124.06	22.21	34	0.54	2.021	Not significant
	Control	18	119.61	26.58				

A - Controlling the conditions of the experiment and preventing the associated accidents: The researcher tried to reduce the safety of the experimental design by controlling the internal variables, especially those that could affect the experiment procedures and results, including :
-Subject teacher -Content of the educational material-Duration of the experiment -Class distribution--Research tools- Physical conditions - - Experimental extinction

-2-**The external safety of the experimental design**: This was done by the researcher doing the following procedures: experimental selection, the interaction of the pre-measurement of equivalence and its effects, the interaction between choice and the experimental variable, and the interaction of experimental situations.

Fourth Research Requirements :
Building instructional design: To achieve the research objectives of educational design in accordance with the experiential learning strategies for first-grade students in the intermediate level in preparing information for the science subject, it required the adoption of a systematic method adopted in the design according to specific steps, stages and goals that can be measured by appropriate evaluation methods, and the researcher reviewed a number of Instructional Designs The instructional design was prepared according to the following stages;
1-Analysis stage: This stage includes defining the study material, defining the target group, analyzing the educational environment, determining the characteristics of students, determining educational needs, and analyzing the academic content.
1-1 -**Determining the study subject:** The science subject, Part Two, which is specialized in biology for the academic year (2021-2022), was chosen, and the researcher committed to the following three units;
Unit One: Biology and Technology
Unit Two: Building an organism's body
Unit Three: Genetics and Evolution
1-2-Defining the target group: The female students of the first intermediate grade in the schools affiliated to Baghdad Education / Al-Rusafa /3 for the academic year (2021-2022) were identified as a target group.

1-3-**Analysis of the educational environment:** To analyze the educational environment in which the educational design will be applied, the selected school was visited to see the availability of materials and tools required to teach and learn science, and the following was found :

-There is one laboratory room in which science experiments are carried out for all intermediate levels.

-Some illustrations and posters are available, some of them are ready, others are prepared by teachers, but they do not have good specifications as an educational tool, so the researcher prepared illustrations and diagrams for the subject being taught.

-There is a library in the school that provides books on general sciences

-The time for teaching science for the first grade is limited to four lessons per week, at a rate of (40) minutes per lesson.

1-4-Defining the characteristics of the female students: The common characteristics of the female students were identified from the interview with the sample members, and it was found that they fall within a similar age group ranging between (13-14) years, and that the social and economic level is close to the majority of the female students, and the members of the research sample are females.

1-5-**Determining educational needs:** The researcher distributed a closed questionnaire to first-year intermediate students, in order to know the needs and difficulties they faced in the first course in science. An appropriate educational environment equipped with teaching aids, moving away from focusing on daily preparation based on memorizing the material, and helping female students to acquire methods of information processing.

1-6-Analysis of educational content: The educational content was analyzed according to Bloom's classification of educational content, into levels (remembering, comprehension, application, analysis, synthesis, and evaluation)

2-Design stage (preparation): This stage includes a number of steps, namely:

2-1-Determining special behavioral goals: Depending on the educational content that was analyzed in the previous stage, the number of goals reached (263) behavioral goals and were classified according to Bloom's levels of educational goals into six levels, and from the content analysis, we

note that most of the behavioral purposes focused on the first four levels (remembering, comprehension, application, and analysis), the comprehension got the highest percentage compared to the rest of the levels.

2-2-Choosing educational materials and aids: According to the results of the reality analysis (the educational environment) in the previous stage of the design, the researcher did the following:

-Preparing a number of charts, shapes, drawings and posters

Providing some models and samples of environmental raw materials -

2**-3-Choosing Teaching Strategies:** Since the researcher adopted experiential learning strategies, she chose four of them, namely: Robin's Table, the Three Bears, Look Before You Hear, and Build and Maintain Confidence.

2-4-Preparation of study plans: The researcher prepared (24) a teaching plan for educational design according to experiential learning strategies, and it was presented to a group of arbitrators in the field of life sciences and teaching methods to find out the extent of its suitability for the content of the material and to verify its validity and in the light of their opinions, some modifications were made, and it was agreed with the science teacher to teach the subject according to these study plans.

2-5-Preparing evaluation methods and its tools: The research tool (Information Processing Scale) was prepared for first-year intermediate students to evaluate the effectiveness of educational design, the researcher reviewed the previous literature, sources and studies, and then prepared the scale as follows:

A - Determining the scopes of the scale: The researcher adopted Sckmeck model (1983) for information processing methods and fields in constructing the scale items, which fits this research and is consistent with its requirements. Sckmeck referred to four methods of information processing: (in-depth study, detailed study, retention of scientific facts, and systematic study)

B - Formulating the items of the scale: The researcher formulated the items of the scale in the light of the theoretical framework of the Shemak model (1983), and the scale included in its initial form (68) items distributed evenly on the four scale areas, and the items varied between positive and negative items.

C- Preparing the scale's instructions: instructions were prepared for how to answer the scale's paragraphs, and they were provided with an illustrative example, as it was taken into account that the scale's paragraphs should be simple and clear, then a paper was placed for the answer, as well as a key for correction, as the researcher identified three alternatives which are (always apply to me, apply to me sometimes, it does not apply to me), noting that the degrees of the alternatives are (1,2,3) respectively for the positive items, and (3,2,1) respectively for the negative items.

D- The apparent validity of the scale: The researcher presented the scale in its initial form, consisting of (68) items, to a number of arbitrators specialized in the field of education, to ensure the validity of the scale in terms of clarity, accuracy, validity and suitability of the paragraphs. The procedures resulted in the deletion of (7) paragraphs from the scale, and thus the number of paragraphs became (61) paragraphs, which obtained a percentage of agreement between the arbitrators (85%). This is a good indicator that indicates the validity of the scale.

E- The exploratory application of the information processing scale: The information processing scale was applied to a survey sample of first-average students, as the sample consisted of (30) students for the purpose of ensuring the clarity of the paragraphs and the scale's instructions, diagnosing ambiguous paragraphs and estimating the time it takes to answer the scale, the time for answering the scale items was determined with (35).

F- Statistical analysis of the scale items: After ensuring the clarity of the items and the scale's instructions, the scale was applied to exploratory sample consisting of (100) female students at Al Rabab Secondary School for Girls, for the purpose of diagnosing the psychometric characteristics of the information processing scale. The following was extracted :

-**Discriminatory power:** the researcher adopted the t-test for two independent equal samples between the upper and lower groups at the level of (05.0) and the degree of freedom (52).It was found that the t-value of all items of the scale ranged between (0.34. -9.78), and accordingly (3) items were excluded from the scale, namely (7, 37, 60), because they obtained a t-value less than the tabular value of (1.960).

-**Construction validity:** the researcher relied on Pearson's correlation coefficient to find the paragraph's correlation coefficient with the total

score of the style to which it belongs. The results showed that the values of the calculated correlation coefficients ranged between (0.12 – 0.669), and when comparing the values of the calculated correlation coefficients with the values of the tabular correlation coefficient amounted (0.20) at the (0,05) level and the degree of freedom (98) (3) paragraphs (7, 37, 60) were excluded, because they obtained a correlation coefficient value less than the tabular value.

G- Scale stability: The values of the reliability coefficient were (0,75, 0,82., 0,860, 0,78) respectively for the scale domains (deep treatment, extended treatment, retention of scientific facts, systematic study), as these values are considered as a good indicator of the stability of the scale. This is a suitable value for study purposes how much in(Anastasi&Urbina, 1997,p. 107-108) The closeness of the reliability coefficient to the correct one reduces the standard error of the measurement and increases the internal consistency of the scale.

H- The final version of the scale: The scale in its final form consisted of (58) items, and the total score of the scale was at its highest level (174) and its minimum (58) degrees, and thus the scale became ready to be applied to the basic research sample to extract the research results.

3-Implementation stage: In this stage, the researcher implemented the educational design on the original research sample represented by the first intermediate grade students. The researcher applied the experiment according to the following steps;

-Coordination and agreement were made with the school administration to organize the weekly lesson schedule.

-The teacher of science began applying the experiment to female students at Al-Tafani Secondary School for Girls by teaching four lessons per week for each of the two research groups. The experiment was applied during the second course of the academic year (2021-2022)

-The two research groups were taught as follows: (the experimental group) was taught according to the daily plans that were prepared in advance according to the experiential learning strategies, and the (control group) was taught according to the daily plans that were prepared in advance according to the usual method.

-The information processing scale was applied on Tuesday (5/4/ 2022), after which the students' answers were corrected for the experimental and control groups, and the results were extracted.

4-Evaluation stage: In this stage, three types of evaluation are performed:
-Preliminary evaluation: The researcher applied the intelligence test and information processing methods before implementing the design, and it was presented to a group of arbitrators in this field with the aim of adjusting the design and verifying its scientific validity and suitability for the design objectives. The arbitrators unanimously agreed on the validity of the design.
-Formative assessment: The researcher has adopted short oral and written tests that can be quickly corrected, as well as homework assignments that students are assigned to do, and asking questions during the course or end of the lesson.
-Final evaluation: its purpose is to identify the impact of the design and the extent to which it achieves the goals that have been set, through the students' answers to the scale of information processing.
Fifth: Statistical means: the t-test for two independent equal samples, the Pearson correlation coefficient, the alpha-Cronbach equation, the eta square equation, and the effect size equation.

Display and interpretation of search results;
First : show the results;
-Information processing: the null hypothesis: (there is no statistically significant difference at the level (0,05) between the average scores of the experimental group students who study according to the educational design of experiential learning strategies and the average scores of the control group students who study according to the usual method, in the information processing scale for science), the results showed that the t-value is greater than the tabular value, and this means that there is a statistically significant difference between the averages for the benefit of the experimental group students who studied science by adopting experiential learning strategies on the control group that studied in the usual way, thus rejecting the null hypothesis, table (2)

Table (2) The T-value of the two research samples for the post information processing scale

The group	Number of female students	Arithmetic mean	Standard deviation	Degree of freedom	T-value		Significance
					Calculated	Tabular	
Experimenta	18	151.39	14.07	34	4.05	2.021	Significant

l							
Control	**18**	**126.50**	**21.94**				

Second: Interpretation of the results;

The results of the research showed that teaching with experiential learning strategies positively affects the methods of information processing for the experimental group students, as these strategies outperformed the usual method,This result is attributed to the effectiveness of teaching with experiential learning strategies in teaching science, which is concerned with practical application, and linking the subject to the educational field and the environment surrounding the student, which helps in acquiring methods of information processing for the science subject, and benefiting from the experiences of students and the teacher's expertise to enable and develop the information received by the student. Teaching with experiential learning strategies works to link study topics to the student's reality, which helped the transfer of information from short-term memory to long-term memory, and then the ability to retain information for as long as possible, as these strategies made the student give examples from her personal experience, and form logical connection and the expansion of study topics through conclusions, and it also helped her to organize information and realize the relationships between information, its recording and scheduling, which led to the development of information processing methods for them , and the link of science to the students' lives directly encouraged them to engage in fruitful and purposeful dialogues in an atmosphere of freedom away from stagnation and monotony. In this way, the results of the research agreed with a study (Tuhma, 2018, p. D)

Third: Conclusions: Based on the findings of the study, the researcher concluded;

1-There is a positive effect of experiential learning strategies in acquiring information processing methods for first-year intermediate students in science.

2-The adoption of experiential learning strategies gives vitality to the lesson and attracts the attention of the students towards the lesson.

Fourth: Recommendations: In light of the results of the current study, the researcher recommends the following:

1-Emphasizing the importance of modern strategies in the field of education by preparing and training teachers' cadres in order to adopt them in their field of work.

2-Preparing a guide for science teachers and teachers in the light of experiential learning strategies and how to apply them in classroom teaching.

3-Adopting experiential learning strategies in science teaching as an alternative to the usual teaching methods.

Fifth: Suggestions;

1-Conducting a similar study that deals with experiential learning strategies with other variables such as (executive thinking, clever thinking, knowledge economy skills)

2-Conducting a similar study dealing with experiential learning strategies in preparing information for science subject for later grades.

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