

The Effectiveness of Teaching the 5W1H Strategy in Scientific Sense among Fifth Grade Bioscience Students in Biology

Prof. Dr. Munther Mubdar Abdul Karim Al-Abbasi and Raji Jaber Rasan Al-Shablawi

Diyala University/ Faculty of Basic Education

Munther-alabassi@yahoo.comBasicscie-gm-14@uodiyala.edu.iq

Abstract:

The research aims to identify the effectiveness of the 5W1H strategy in the scientific sense of the fifth grade students of the bioscience subject, as the research sample included two groups, one of which was represented by the control group and the number of its students was (32) students, and the other was represented by the experimental group and the number of its students was (30) students, and in a random withdrawal method, the two researchers chose (olive prep for boys) from the research community represented in the middle and secondary schools of the Directorate of Education in Qadisiyah Governorate/ center, as the researchers adopted the experimental research approach as a method for conducting their research, which includes an independent variable (5W1H strategy) And a dependent variable (scientific sense), as the researchers chose the experimental design to adjust the research variables, and before starting the application of the experiment, the researchers rewarded the two research groups for the purpose of obtaining accurate results with the following variables: (the age of time calculated in months, the previous achievement of students, and the intelligence test of Daniels, the scale of scientific sense), and after conducting the equivalence between the two research groups, the researchers prepared the requirements of the application of the experiment of plans, goals and tests for the two research groups, and after the completion of the application of the experiment, the researchers applied their research tool to the two research groups, as the researchers obtained data for the two research groups, and those data were processed statistically by Test (t-test) for two independent samples and the results showed, the students of the experimental group outperformed the students of the control group according to the strategy of 5W1H in the scientific sense.

Keywords: 5W1H strategy, scientific sense, fifth-grade students of bioscience, biology.

Chapter One :Definition of Research

First : The problem of research : In a world characterized by rapid knowledge expansion, the teaching process faces many problems. Perhaps the most prominent of these problems are the teaching methods and methods prevailing in our schools, which depend on teaching students facts and information without understanding and realizing the interconnectedness between them. The role of the teacher in the usual teaching methods is to transfer knowledge and information and the role of the student is the passive recipient of it, and this leads to the student's lack of interest in the subject and thus a decline in the level of scientific sense. This requires teachers to change their strategies and

methods of teaching. The researcher has noted that, as a teacher of biology for sixteen years, the usual method is the dominant method of teaching, which depends on memorization and retrieval from the learner, which leads to the difficulty of analyzing and reconstructing information in addition to the difficulty of perceiving the relationships between the parts of the same subject and a group of topics and judging those relationships, and the difficulty in developing the scientific sense they have, as well as through the researcher's review of some studies that dealt with the scientific sense such as the apparent study (2016), the Al Osaimi study (2019), the Kazim study (2018) and the Al Rafi study (2018) confirmed that there is a

decline in the scientific sense among students, as they were found to rely to a large degree on the usual methods based on conservation and indoctrination, where the information is given ready to students and the lack of use of activities and neglect of the scientific sense, as well as the lack of practice of the field of knowledge and emotion during teaching, and this leads to not using any aspect of the scientific sense during the teaching of science in general and the subject of biology in particular, and hence the problem of research with the researcher is crystallized, as it is believed that it is necessary to pay attention to The scientific sense and work to improve it among students in light of the use of modern teaching strategies and methods, including (5W1H), which is one of the modern strategies, so the researcher thought that experimenting with it may contribute to the development of their scientific sense.

Based on the above, the researcher considered that the occurrence of the research problem with the following question:

(What is the effectiveness of teaching the (5W1H) strategy in the scientific sense of fifth grade students of bio-science with biology?)

Second : The significance of research : The current era is witnessing a scientific revolution and rapid changes that included all fields that humanity has not witnessed before, so it was necessary to respond to these changes through the development of all institutions of society, including educational. The knowledge revolution is a feature of the modern era and extends in the educational process in all its fields, describing education as responsible for preparing students to face the future and keep pace with the manifestations of development that adapt man to developments in his environment, especially in the education of new generations. (Groan,2012 :26). There are a set of educational strategies and models that have emerged recently that have played a role in advancing the learning process, so it has become necessary for teachers to recognize them because they have important effects on education and its results. Many educators believe that models based on structural theory are more diverse and creative in education, so teaching should be made in order to understand,

make learning meaningful, maintain and integrate it. (Al-Yamani, 2009: 46) , and there are many strategies that go back to active learning that we can use in teaching. One of these strategies is the 5W1H strategy, which is a shortcut to words or keys to questions that form a field of research. These words are : who, what, when, where, and why. It means why. It has become shortened by 5w, but how does it mean how it has been shortened by 1H, and this strategy is used to summarize topics so that it allows the student to absorb learning content and store it in memory so that it provides high storage spaces, as it occupies memory with the important issues contained in the text.)Attia,2018: 381)

Sense is one of the finest mental activities that a person practices naturally in his daily life when faced with a problem. These practices differ from person to person according to his control of the skills he has already learned. Scientific sense has practices similar to the rest of the other life practices that a person learns and trains on until he reaches mastery and flexibility in the face of most diverse situations and speed in accomplishing the tasks required of him . (Hossamuddin,2013: 1) Through these practices, we infer the existence of scientific sense as it affects the cognitive, emotional and skill aspects of the learner, and for the learner, mental performances become repeated make them established mental habits for the student. (Al-Zaeem,2013: 67) and she stressed (Al-Shahri,2011) that students need to be taught to another type of thinking and gaining mental processes that make the learner aware of his information able to understand, and to understand how to think, as well as stressed the increased interest in the emotional dimension because it affects the ability, readiness, effort, perseverance and responsibility of the personal learner. (Al-Shahri,2011: 214) That the general sense is mostly based on instinct , as many of the people of the community follow certain ideas just because they rely on their sense without relying on trying to interpret this sense, they may feel this is incorrect and not based on understanding and awareness , in addition to the development of the scientific sense helps learners to address the tasks entrusted to him and solve problems faster and better , and then its

impact remains throughout his life ,so he is able to modify intentionally and can overcome the deficiencies in mental performance, and this develops the learner's responsibility and independence and earns him self-confidence and self-esteem as well as accuracy in performance and the ability to make the appropriate decision in daily life situations.Hossamuddin,2013: 2)

The researcher believes that in order to achieve the objectives of scientific education in general ,and the objectives of teaching biology in particular, attention must be paid to the scientific sense and its development among thelearners through the use of modern strategies, methods and teaching models that help them enrich their educational environment, which helps them to improve their biological information, scientific sense and mental activities.

Third: The goal of the research and its hypothesis: This research aims to identify the effectiveness of the 5W1H strategy in the scientific sense of the fifth grade students of the biological science in the subject of biology, and to achieve the goal of this research, the researchers formulated the following zero hypothesis:

There is no statistically significant difference at the level of significance (0.05) between the average scores of students of the experimental group who will study biology with the 5W1H strategy and the average scores of students of the control group who will study the same subject according to the usual method in the measure of scientific sense prepared for the purposes of this research

Fourth : The limits of the research: The current research was limited to :

- 1- Spatial Limit: Boys' Government Preparatory and Day Secondary Schools affiliated with the Directorate of Qadisiyah Education (the Center), which contains the bioscientific branch.
- 2- Time limit: The first semester of the academic year (2021-2022).
3. Human limit: Fifth-grade students of bioscience .
- 4- Cognitive Limit: The first four chapters (Nutrition, Digestion ,Breathing , Discharge, and Movement) of the Biology Book for the fifth grade of Bioscience, 8 / 2019

Fifth : Definition of terms :

Strategy 5W1H: Define it :

.(Ambo Saidi et al.,2019) that it is : a strategy that relies on summarizing the subject of the lesson using the beginning of the letters for common questions,who? What? When? - Yes, I know, but where ? Why? How? (Ambusaidi et al.,2019: 416)

.The researcher defines it as a procedural: It is a set of preplanned steps and practices that the researcher undertakes to teach biology to the students of the experimental group according to the steps of the 5W1H strategy, which is to summarize the topic according to the six questions (who? What? When? - Yes, I know, but where ? Why? How?

Scientific Sense: Defined by :

(Dahir,2016): Mental activities with a high level of cognition and understanding practiced by the cognitive learner by activating the majority of the senses, linking previous experiences to the present, numerical sense, thinking, and emotional love of curiosity, enjoying scientific work, mental alertness, perseverance, controlling recklessness . (Zaher, 2016: 15)

. The researcher defines it procedurally: It is the mental activities that are measured by the total degree that the student obtains in the scale of scientific sense, which includes two areas. The first is cognitive and consists of four aspects (first :linking previous experiences to the present ,second : numerical sense,third: activating the majority of senses ,fourth :thinking about thinking) and the second is emotional. It consists of five aspects (first: love of scientific inquiry, second: mental vigilance,third :enjoying scientific work,fourth :perseverance , fifth : controlling recklessness),which theresearcher prepared for this purpose .

Chapter Two : A Theoretical Framework and Previous Studies

The first axis: A theoretical framework:

Active learning strategies: Active learning strategies are a reflection of the ideas of structural theory, which emphasizes the need for learners to build their knowledge through their interaction with their environment. To apply active learning, it is necessary to diversify its methods and strategies. From a long time it has been believed that the use of diversification increases learners' learning and their attention, and thus makes them more receptive to learning. The key to enhancing learning is the

diversification of strategies. The work of the strategy is represented by decisions taken by the teacher and reflected in patterns of actions taken by the learner and the teacher in a learning situation. (Badir, 2008: 89)

Strategy 5W1H

It is one of the most modern active learning strategies and depends on summarizing the lesson topic using the beginning of letters for FAQs. Who? What? When? - Yes, I know, but where? Why? How? And its name represents the acronym for the beginning of the letters of these words or the keys to these questions is a field of research and these words are: Who: Who, What: What, When: When, Where: Where, Why: Why, How: How. to be the name of the 5W1H strategy. (Embu Saidi, et al., 2019: 416) .

Scientific Sense:

According to the opinion of the scientist Aristotle, the sense is two types, the apparent sense represented by the five senses (sight, hearing, smell, taste, touch), and the internal sense that occurs by the five internal senses (common sense, imagination, conservatism, delusion, disposition), as the common sense is the perception of images and imagination is its preservative and illusion is the perception of meanings and memory is its portfolio, but the composition and organization of meanings is the dispositive (Riyadh, 2018: 22)

The concept of scientific sense

Adding a scientific word to the word sense, the term becomes referring to the concept of perception related to science. This is the scientific sense where (Ford, 2012) defines it, thinking about making meanings from focusing on scientific practices and types of dialogue and discourse through the application of special methods such as communication and representation. This makes scientific practices easy and easy. (Ford, 2012:211), and (Besson, 2004) defines it, is the replacement of common sense (Common Sense) for learners, through which learners interpret phenomena based on their common public thinking from their point of view with scientific sense (Scientific Sense), which depends on the skills of reasoning and investigation and the use of scientific methods to

reach appropriate interpretations (Besson, 2004: 133)

Aspects of scientific sense: The scientific sense consists of several aspects that fall into two areas:

First : The field of knowledge: includes aspects (linking previous experiences to the present, activating most senses, thinking about thinking, numerical sense) .

Second : The emotional field: It includes aspects (love of scientific inquiry, enjoying scientific work, perseverance, mental alertness, controlling imprudence) . (Al-Shahri, 2011: 259), (Al-Zaeem, 2013: 9)

The second axis: Previous studies: Studies that dealt with scientific sense: Through the researcher's knowledge of previous studies, it was found that there were few previous studies that dealt with the strategy of 5W1H with scientific sense in the subject of biology (according to the researcher's knowledge), so the researchers used studies that dealt with the variable of scientific sense in various study materials and strategies My agencies :

1- Study (Abu Omra, 2016): The study was conducted in Palestine, with the aim of knowing "the impact of using the strategy of digital concept maps in developing the scientific sense of science among the students of the ninth grade.

2- A study (Riyadh, 2018): The study was conducted in Iraq, with the aim of knowing "the impact of place matting strategy in the achievement of science and scientific sense among the fifth grade primary school students

3- A study (Al-Rafai, 2018): The study was conducted in Iraq, with the aim of knowing "the impact of the strategy

m U R D E R) Modified in the achievement of fourth grade scientific students and their scientific sense in the subject of physics .

4- Study (Mashhad, 2021): The study was conducted in Iraq, with the aim of knowing "the impact of the strategy (R. E A C T) In the achievement of second-grade intermediate students in their science and scientific sense.

Chapter Three : Research Methodology and Procedures:

First : Experimental design: The selection of experimental design is one of the important things that the researcher is doing. It helps him determine the factors surrounding the

experiment so that the researcher can know what is happening and what he is doing. Since the current research includes an independent variable, which is the 5W1H strategy, and a

dependent variable, which is (scientific sense), the researchers have chosen the experimental design with partial adjustment as shown in Figure (1) .

group	The independent variable	Dependent variable	Search Equipment
Experimental group	Strategy 5W1H	Scientific Sense	Science Sensitometer
Control group	The usual way.		

Second : The research community and its sample:

1- The **research community**: The current research community represents the students of the fifth grade of bioscience in the middle and high schools for boys (government) only affiliated to the General Directorate of Education in Qadissiya Governorate/ center for the academic year (2021-2022), in which the number of the fifth grade of bioscience is not less than two divisions, and to that end, the researchers visited the Directorate of Education of Qadissiya Governorate, in order to identify the middle and secondary schools for boys that contain two divisions and more, which are located in the center of Qadissiya Governorate, with a number of (15) schools.

2- **The research sample**: The researchers selected the olive prep for boys located in the Diwanayah District Center in Qadisiyah Governorate with a simple random appointment

Table (1) Distribution of students of the experimental and control research groups

group	Section	Number of students
Experimental group	C	30
Control group	B	32
Total	2	62

Third : The equivalence of the two research groups: The researchers were keen to conduct the equivalence in the following variables: (the age of time calculated in months, the intelligence test, the scientific sense scale) and in a table showing the equivalencies above .

Table(2) The arithmetic mean, standard deviation, and the calculated and tabular values of the variable (temporal age calculated in months, Daniels IQ test, scientific sense scale) for the two research groups.

Variable	group	Number	Arithmetic Mediation	standard deviation	Variance	Freedom degree	Lost Values		Statistical function
							Calculated	tabular	
Chronological age	Experimental group	30	201.43	6.58	43.29	60	0.103	2	Statistically nonfunctional
	Control	32	201.28	4.95	24.53				

	1 group								
IQ test	Experimental group	30	17.47	3.06	9.36		1.242		
	Control group	32	16.28	4.30	18.53				
Science Sensitometer	Experimental group	30	33.67	7.72	59.61		0.513		
	Control group	32	32.50	9.95	99.10				

Fourth : Control of extraneous variables: Which is to stabilize the factors and variables related to the phenomenon under research except the independent factor, a set of factors and variables that affect the research experience may appear, specifically on the variable that is dependent on him or against him and thus obtaining good results, and to know the impact of the independent factor. The extraneous variables must be controlled before the experiment is conducted, i.e. the inventory of all extraneous variables except the independent variable in

order to isolate them and prevent their impact on the result. The two researchers have adjusted all extraneous variables that affect the experiment, including (subject matter, subject teacher, duration, distribution of classes, physical conditions, experimental extinction, measurement tools, and teaching aids), as the two research groups studied according to the prescribed quotas for the subject of biology by five quotas per division per week, according to the schedule of distribution of classes

Table (3) Distribution of weekly lessons for the two research groups

Lesson	Time	group	AlYaum	No.
Lesson Four	(10,30 - 11,15)	Control group	Saturday	1-
Lesson Five	(11,20 - 12,5)			
Lesson One.	(8,00 - 8,45)	Experimental group	Sunday	2-
Lesson One.	(8,00 - 8,45)	Control group		
LESSON TWO	(8,50 - 9,35)	Experimental group		
Lesson Three	(9,40 - 10,25)			
Lesson Three	(2,40 - 3,25)	Control group	W	3-
LESSON TWO	(1,50- 2,35)	Experimental group		
Lesson One.	(1.00-1.45)	Control group	Thur	4-
Lesson Three	(2,40 – 3,25)	Experimental group		

Fifth: Research requirements: For the purpose of applying the research experience, the researcher has prepared some supplies, including :

A- Determining the scientific material: The researchers identified the scientific material that will be taught to the students of the two research groups during the duration of the experiment.

The scientific material included the first four chapters of the Biology Book for the fifth grade of Biology, the eighth edition of 2019 by

(David, Hussein Abdel Moneim and others) and a diagram (1) showing this Blueprint (1) The content of the chapters of the Biology Book for the fifth grade of Bioscience

No.	Terminations	Scientific or Training Subject
1	The first	Nutrition and digestion
2	Second	Breathing and gas exchange
3	The third	OUTPUT
4	Four	Transaction

2- Formulating behavioral goals: The two researchers were introduced to a number of behavioral goals and with the help of a number of experienced professors, 222 behavioral goals were formulated according to Bloom's classification distributed at the first six levels: (remembering, understanding, applying, analyzing, synthesizing, and evaluating). These goals were presented to a group of experts and specialists in the field of education, psychology, teaching methods, and biology teachers, to express their opinions and observations, and based on an agreement rate of (80%) or more of the experts' opinions, some behavioral goals were modified and the percentage and the value of Kai square for each of the behavioral goals was calculated and compared with the tabular value of (3,84) with a degree of freedom (1) and at the level of significance (0.05). The results showed the validity of all behavioral goals, table (15) , and all goals were adopted and kept in their final form (222) behavioral goals.

3. Preparation of study plans: The two researchers prepared teaching plans for the topics of biology that will be studied during the experiment, in light of the content of the planned book and the behavioral goals prepared, and according to the strategy of 5W1H for the students of the experimental group and according to the usual method for the students of the control group, and after presenting it to the experts and arbitrators, it became ready for implementation.

Sixth: The research tool: The research tools are one of the important and basic things that are determined and built by the researchers and the

research includes a dependent variable is (scientific sense) and therefore the research tool is the measure of scientific sense and in what followsJ Detail to prepare the tool :

Scientific Sense Scale: The scientific sense scale is one of the two research tools, so the researcher prepared the scientific sense scale for fifth grade students of biological science according to the following steps:

1- Determining the goal of the scale: The scale aims to measure the scientific sense of the students of the two research groups (experimental and control) for the fifth grade of biological sciences.

2- Formulation of the paragraphs of the scale:After reviewing the previous studies and literature, the researcher formulated the paragraphs of the scale according to the scientific sense in two areas of knowledge and emotion, as the number of paragraphs of the test in its initial form reached (45) paragraphs, after presenting them to a group of experts and arbitrators, which are in the form of positions that require students to solve, and they are divided into aspects of the scientific sense, which are : linking previous experiences with the present (5) paragraphs, activating the majority of senses (5) paragraph, thinking about (5) paragraphs, love of scientific exploration (5) paragraphs, mental alertness (5) paragraphs , enjoying scientific work (5) paragraphs , perseverance (5) paragraphs , controlling recklessness (5) paragraphs , where some modifications were made and some paragraphs were deleted, so that the scale consists of (40) paragraphs in its final form to suit students of the fifth grade of biological science.

3- Setting the instructions of the scale:

A- Answer instructions: The researcher developed instructions to answer about the scientific sense scale, which requires students to write the information allocated from it (student name, division, class, school name).

B- Correction model: The scientific sense scale was corrected after reviewing the literature related to scientific sense and its given degree and consulting specialists in the field of methods of teaching science, measurement and evaluation, and it was agreed to give each indicator of the scale consisting of (40) degree index (2) for each indicator (always applicable to me), (1) degree for each indicator (sometimes applicable to me), and (0) degree for the indicator (never applicable to me), and thus the degree of response to the scale ranges between (0-80) degree.

4- The sincerity of the scientific sense scale:

A- Apparent honesty: For the purpose of verifying the apparent validity of the scale, a measure in its initial form was presented to a group of arbitrators and specialists in the field of methods of teaching science, measurement and evaluation (and based on their consent, the apparent validity of the scale can be reached) in order to express their observations about the validity of the paragraphs and their scientific and linguistic formulation and their suitability to the level of fifth grade students, and after taking their observations, some minor amendments were made and some were deleted, and the percentage was calculated (100% -83%) and the Ki square (12-5,33) and balanced with the tabular (3.84) and degree of freedom (1), thus the scale consists of (40) paragraphs in its final form.

B - Building honesty: It aims to determine the number of features and attributes that characterize the scale and their nature that form the basis of a set of relationships or scales marks (Melhem, 273:2010). The researcher verified the validity of the building for the scientific sense scale despite verifying the validity of the test on the face of it, and for this the researcher used the scores of the exploratory sample used in the statistical analysis of the scale.

5. Exploratory application of the scientific sense scale:

A - The first exploratory application of the scientific sense scale: The scale was applied to an exploratory sample of (30) students of the fifth grade of the bioscience in (Jewelry Preparation J for boys) on Tuesday, 2/11/2021 to ensure the clarity of the scale instructions and the clarity of its paragraphs, as well as the time taken to answer the scale, as it became clear to the researcher that the instructions of the scale and its paragraphs were clear.

B - The second exploratory application: Statistical analysis: After ensuring the clarity of the wording of the paragraphs and the time taken to answer, the test was applied again to a survey sample of fifth grade students in the biological science in (Qutaybah Preparatory School for Boys) consisting of (100) students, and the application was on Tuesday, 2/11/2021, and the answers of the students were corrected as a sample was chosen by (27%) from the highest grade and (27%) from the lowest grade to represent the lowest group, and then analyzed to the top two groups and our parents statistically to find the following:

6- The discriminatory strength of the test paragraphs: The discriminatory strength of each test paragraph was calculated using the discriminatory strength equation, as it became clear that the discriminatory strength of the paragraphs ranges between (0.22-0.78), so all the test paragraphs are acceptable, as the test paragraphs are good, if the coefficient of excellence is (0.20) and more (Al-Najjar, 2010: 210).

7- The stability of the scientific sense scale: To calculate the stability of the internal consistency of the test, the researcher used the Alpha Cronbach method. He used this method to calculate the stability coefficient of the scale, and found that its stability coefficient is equal to (0.965), he found the stability by halving (0.91) and the stability correction coefficient (0.95), which is a good stability coefficient, if the value of the stability coefficient is from (0.67) and above is good (Al-Nabhan, 2004: 240).

8- The scientific sense scale in its final form: After extracting the validity coefficient and the psychometric properties, and the stability coefficient, the scale in its final form consisted

of(40) indicators, ready for application to the research sample.

Seventh : Statistical means: The two researchers used the following statistical means: (t-Test, paragraph difficulty coefficient,K-square coefficient for independence, paragraph discrimination strength equation).

Chapter Four : Presentation and Interpretation of Results

First: Presentation of the results related to the null hypothesis : There is no statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students who will study biology according to the strategy (**5W1H**) and the average scores of the control group students who will study the same material according to the normal method in the scale of

scientific sense, and to verify the validity of the previous hypothesis, the researcher extracted the arithmetic average, variance and standard deviation of the students of the two research groups, and it emerged that the average scores of the experimental group who studied according to the strategy (5W1H) amounted to (44.40) and that the variance amounted to (64.04), and that the average scores of the control group students who studied according to the normal method amounted to (38.50), and that the variance amounted to (99.10), and when using the t-test test for two independent samples, the statistical results showed that there is a statistical difference, and that the calculated value is (2,561) is greater than the value of the scale (2) at the level of (0.55) and (60) and a table (4) shows that :

Table (4) Test results for two independent samples of the two research groups on the scientific sense scale of the experimental and control group

N o.	group	Number of students	Arithmetic mean	standard deviation	Variance	Freedom degree	T value		Statistical significance at the level of 0.05
							Calculated	tabular	
1	Experimental group	30	44.40	8.00	64.04	60	2,561	2	Function
2	Control group	32	38.50	9.95	99.10				

This result indicates the superiority of the students of the experimental group who studied according to the strategy of (**5W1H**) over the students of the control group who studied according to the usual method in the scale of scientific sense, thus rejecting the second zero hypothesis and accepting the alternative hypothesis that states that : (There is a statistically significant difference at the level of significance (0.05) between the average grades of the students of the experimental group who will study biology according to the strategy of (**5W1H**) and the average grades of the students of the control group who will study the same subject according to the usual method in the scale of scientific sense).

Second : Interpreting the results related to the null hypothesis

The results in Table(4) showed that there are statistically significant differences between the average scores of the experimental and control groups in the scale of scientific sense and in favor of the experimental group. This means that the students of the experimental group who studied according to the strategy (5W1H) are superior to the students of the control group who studied according to the usual method, in the scale of scientific sense and the researcher attributes the reason for this to :

1. The presentation of the lesson according to the (5W1H) strategy provided an interactive environment in which students are positive and effective, and this helped in generating new ideas, and training students to think about the solution without giving direct solutions, which makes it easier for them to solve problems and reach the top of creativity towards biology .

2. The role of the researcher within the (5W1H) strategy is based on encouraging students to ask questions, know the effects, find appropriate solutions to them, discuss them, give them the opportunity to put new ideas on the subject of the lesson and motivate students to increase participation in the discussion and reach higher thinking about solutions towards situations without hesitation or fear because each student in the group has cooperated with the members of his group .
3. **The** use of the (5W1H) strategy was an incentive to stimulate and give students more creativity and freedom from traditional restriction in the practice of their ideas to search for facts and information, uncover ambiguity in the content of the subject while reading it, conclude what is correct, and judge the validity of information, as well as provide students with the opportunity to build their knowledge through positive interaction between students themselves, as well as interaction with the subject teacher, which makes learning meaningful and stimulating and leads to an increase in creativity and innovation among students.

Third: Conclusions : In the light of the results of the research carried out by the two researchers, they reached the following conclusions:

The effectiveness of the 5W1H strategy in raising the level of scientific sense among students in the fifth grade of bio-science In biology .

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

- 1- Adopting modern teaching strategies such as the (5W1H) strategy for active learning in teaching biology and other subjects, because of the effective impact of research results on the scientific sense.
- 2- The need for appropriate conditions, possibilities and educational means to facilitate the use of the (5W1H) strategy in the education process.
- 3- The need to inform the Ministries of Education and Higher Education to prepare

a guide that includes modern teaching strategies such as the strategy (5W1H), which has proven its effectiveness in teaching, and this is proven by the results of the study with the need to develop models of teaching plans for the strategy.

Fifth: Proposals : Complementing the current research, the researcher proposes the following :

1. Conducting a study to compare the effectiveness **of the strategy** (5W1H) with other strategies of active learning.
2. Conducting further studies on the use of **the (5W1H)** strategy at other stages of study for other subjects.
3. Conducting a study to assess the level of students' practice of scientific sense at different educational stages.
4. Conducting another study to find out the effectiveness **of the strategy** (5W1H) in other variables such as problem-solving skills, decision-making ability, formal thinking and supercognitive thinking.

References:

- 1) Abu Omra, Asmaa Mohammed Nassar (2016) : **The Impact of Employing the Strategy of Mapping Digital Concepts in the Development of the Scientific Sense of Science in the Essential Ninth Grade Students**, (unpublished Master Thesis), Islamic University, Faculty of Education, Gaza, Palestine .
- 2) Embo Saidi, Abdullah bin Khamis, and others (2019): **Teacher Strategies for Effective Teaching**, Dar al-Masirah for Publishing and Distribution, Amman, Jordan .
- 3) Badir, Kariman (2008): **Active Learning**, 1st Edition, Dar Al Masirah Publishing, Distribution and Printing, Amman .
- 4) Jarwan, Fathi Abdul Rahman (2012): **Teaching Thinking Concepts and Applications**, University Book House, Al Ain, United Arab Emirates.
- 5) Daoud, Hussein Abdel Moneim et al. (2019) : **Biology for the fifth grade of Bioscience**, 8th Edition, General Directorate of Curricula, Baghdad .
- 6) Al-Rafai, Hossam Halim Obeis (2018): **The impact of the modified strategy (M.U.R.D.E.R) in the achievement of fourth grade students and their scientific sense in the subject of physics**, (Master Thesis), University

of Babylon, Faculty of Basic Education, Iraq, Babylon .

7) Al-Zaeem, Heboallah Abdul Rahman (2013) : **The Effectiveness of Employing the Entrance of Scientific Arts in Developing the Scientific Sense of the Eighth Grade Basic Students in Gaza**, (unpublished Master Thesis), Islamic University, Faculty of Education, Gaza, Palestine .

8) Al-Shahri, Iman Ali Mahmoud (2011): **"The Effectiveness of a Proposed Program in Science Based on the Integration of Some Cognitive Theories for the Development of Scientific Sense among Middle School Students,"** the 15th Scientific Conference of the Egyptian Association for Scientific Education, (New Thought for a New Reality, September 6-7), Egyptian Association for Scientific Education, Cairo .

9) Zaher, Aqeel Amir Jabr (2016): **The effectiveness of integrated education and active thinking in the subject of physics and scientific sense among middle school students**, (PhD thesis), University of Baghdad, Faculty of Education, Ibn Al-Haytham, Iraq, Baghdad .

10) Al-Osaimi, Hamid Hilal (2019) : **The impact of using the strategy of cognitive apprenticeship in teaching biology on the development of biological concepts and scientific sense among secondary students**, Educational Journal No. 66, Taif University, Saudi Arabia.

11) Attia, Mohsen Ali (2018) : **Active Learning Modern Strategies and Methods in Teaching**, Dar Al-Shorouk Publishing and Distribution, Amman, Jordan .

12) Kazem, Zahraa Riad (2018) : **The impact of the place mat strategy on the achievement of science and scientific sense among the fifth grade primary schoolgirls**, (Master Thesis), Iraq, Qadissiya .

13) Mazen, Hossam El-Din Mohamed (2013) : **Scientific Sense from the Perspective of Teaching Science and Scientific Education**, a scientific article published on the blog of Professor Dr. Hussam El-Din .http://kenanonline.com/users/d.r_hosam2010/postas/532076:

14) Mashhad, Reyam Anwar Saud (2021) : **The Impact of R.E.A.C.T's Strategy in Achieving Second Grade Students**

Intermediate in their Science and Scientific Sense, (Master Thesis), Babylon University, Faculty of Education, Iraq, Babylon .

15) Mel hem , Sami Mohammed (2010) **Research Methods in Education and Psychology**, 1st Edition , Dar al-Masirah for Publishing and Distribution , Amman , Jordan .

16) Al-Nabhan, Musa (2004), **Fundamentals of Measurement in Behavioral Sciences**, 1st Edition, Dar Al-Shorouk, Amman , Jordan .

17) Al-Najjar, Nabil Juma Saleh (2010), **Measurement and Evaluation Applied Perspective with Spps Programming Applications**, 1st Edition, Dar Hamid Publishing and Distribution , Amman , Jordan .

18) Al-Yamani, Abdul Karim, and Alaa Sahib Askar (2009) : **General Teaching Methods, Teaching Methods and Practical Applications**, 1st Edition, Zamzam Publishers and Distributors, Amman

19) Besson, u, (2004) : "Some features of casual reasoning (Common sense and Physics teaching)" , Journal of Research in Science and Technology Education, vol. (22) No (1) , University of Pavia, Pavia .

20) Ford, Michael (2012) . **A Dialogic Account of Sense- Making in Scientific Argumentation and Reasoning Cognition and Instruction**, 30 (3), 207-245. *Econometrica*, 73(2): 20-90

21) Weatly , G. (1991). "Constructivist Perspectives on Science and Mathematics Learning " , Science Education Vol. (75) , No (1) . , A Wiley Company , Newyork .