

# THE STRATEGY OF DIFFERENTIATED EDUCATION IN THE ACHIEVEMENT OF THE FIFTH BIOLOGY STUDENTS IN BIOLOGY

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## Research Summary

The current research aims to identify the effect of the differentiated education strategy on the achievement of the fifth grade biological female students.

The number of female students in the research sample was (70) students, with (35) students in each of the two groups. The researcher rewarded the students of the two groups (experimental and control) statistically by using chi-square and t-test in the following variables: (Academic achievement in biology for the fifth grade biology For the academic year (2021-2022), the age of students calculated in months, the educational level of the fathers, the educational level of the mothers, the parity in the general average) and there were no statistically significant differences between the two groups in these variables.

After the researcher identified the educational material, she sought to formulate the behavioral objectives of the subjects and their number was (40) behavioral objectives, and prepared the teaching plans for both groups.

In order to achieve the goal of the research and test its hypotheses, the researcher is required to prepare the research tool, which is an achievement test, which in its final form consists of (40) objective paragraphs and its formula was (multiple choice, pairing, complementation) and the paragraphs obtained a percentage (85%) of the agreement of experts, and the researcher extracted the difficulty factor It ranges between

(0.25-0.54) and the discriminatory strength of its paragraphs ranges between (0.31-0.68) and the degree of stability is (0.838).

The researcher taught the two groups herself, and the researcher applied her research tools in the first semester to the students of the two research groups. In order to treat the data statistically, the statistical packet system (spss) was used, and the results showed the following:

### **The researcher recommended a set of recommendations, including:**

- 1- The necessity of using the differentiated education strategy in teaching science subjects in general and biology in particular, because this strategy contributed to raising the level of achievement of fifth grade biology students.
- 2- Introducing modern strategies in teaching, including the differentiated education strategy, in general science teaching methods programs taught to students in educational colleges.

### **The researcher suggested a number of future research projects, including:**

- ❖ Conducting studies to identify the impact of the differentiated education strategy on learning patterns in biology on other variables such as (creative thinking, attitude, inclination)

**Research problem:** The educational process in general faces many problems and obstacles, such as: the large number of students in the classroom, the lack of use of teaching aids, as

well as the scarcity of laboratories, and the sufficiency of traditional teaching methods and considering the student only as a recipient, which led to a negative impact on their academic achievement. And that these problems put the authors of the entire educational and pedagogical curricula in front of great challenges in terms of setting appropriate educational goals, taking into account the identification of students' characteristics, needs, abilities, inclinations and preferred learning methods according to the course of the new situation, as the challenges facing education in general have an effective impact on many transformations. In the educational process in the twenty-first century, and in light of globalization and the explosion and acceleration of technology, decision-makers in educational institutions have made them reconsider the structure of education, its curricula, and its objectives in order to reach outputs that are consistent with the requirements of the labor market. (Al Butti and Saad, 2018: 45).

Hence the idea of researching the use of a teaching method suitable for teaching female students at all levels and in line with their inclinations, desires and learning styles.

The problem of the current research is summarized in the following question: Is there an effect of the differentiated education strategy on female students' achievement in biology?

The importance of the research: The development that the world is witnessing in the technological field requires us to work in full swing to catch up with the developed nations and keep pace with their development, and this can only be done through scientific and technological progress, in addition to the fact that progress in these two areas places the responsibility on education in delivering What is new for the students? (Al-Mouji, 2003: 41).

Which made our era differ from the past in terms of the speed of development and change in all fields, which led to the need for its contemporaries to have a special education that matches the nature of the changes taking place in it. (Ashtioh et al., 2011, p. 11)

And because education plays an important role in developing societies and finding individuals who are able to excel and be creative in an era in which development is increasing day after day for most areas of life, as the challenge has become clear to the individual in terms of acquiring information, skills, values and principles that enable him to keep pace with this development. (Zamel, 2010: 3)

Modern education aims to educate the student in an equal education, physically and mentally, by identifying the educational methods and teaching methods that emphasize the student's self-sufficiency in obtaining the experiences and knowledge that the educational situation prepares for him, which transfers the focus of attention from the teacher to the student to achieve the desired goals by paying attention to moving away from the methods of indoctrination. In which the student is determined to receive information without interacting with it. (Abdul Rahman, 2008:157)

As a result, education has an important responsibility, which is to keep pace with that great development through the preparation of human cadres capable of keeping pace with the continuous scientific and technical development and keeping pace with it, and able to successfully adapt to the rapid changes that are imposed on society, and work on developing individuals' experiences, refining their talents and raising their motivation, and that By preparing them for a comprehensive, integrated and parallel preparation in all aspects (spiritual, mental, physical and social) so that one side does not dominate over another, so they become useful members for themselves and happy in their lives. Therefore, education is witnessing great global interest and continuous development for the better, and education also plays an important role in the lives of all advanced peoples. and developing. (The Resource, 2003:18)

A. Modern education focused on the learner and made him a god. Its role was not limited to increasing information and transferring knowledge only, but rather aimed at teaching students how to think and how to learn, not how to memorize vocabulary and textbooks without

realizing them and benefiting from them (Al-Hilah, 1999: 265)

It also works to provide all the means that enable individuals to meet their needs and increase their well-being and knowledge of their rights and practices, and education can only achieve its goals through channels, the most important of which is the school, which is a social institution established by society to make its members good members, and also contributes to participation in various Human activities, and thus contribute to the renewal of life through the cultural heritage left to us by the past and also contribute to its development (Al-Khouli, 2001 (116)

The educational process is no longer an easy matter for those who have the ability to memorize a lot of information to enter the classroom and deliver it to the students, the educational process has become in need of a lot of planning. (Muhammad, 2004:185)

Therefore, there must be a dialectical relationship between the curriculum, education and society that secures the state of belonging between the person and the learner and the social and cultural environment in which he lives in order to achieve the sincerity of belonging and contemporary, which in turn provides adaptation to life and this is the loftiest goals of education in contemporary societies (Khawaldeh, 2007: 33).

Science curricula are of great importance and play a major role in progress and prosperity in various fields of interest to individuals and societies, as the prosperity, development and progress of any nation is based primarily on its educational system. Updates and conventions for its educational system. Great efforts have been made to develop and improve these curricula and reform teaching and learning in them, starting with their objectives, passing through their content, teaching methods and appropriate teaching aids, and ending with evaluating their various educational outcomes. Al-Qishi and Discourse, 2019 (294)

The method of teaching has a clear and tangible effect in achieving what the education aims at, so the teacher must not only be familiar with his subject, but go beyond it to become familiar

with his way, his style, his personality, and his relationship with students, and no matter how rich he is with information, he must have a successful way to deliver information to them (Faraj). 2009: 19).

Effective education does not follow one specific method so as not to limit and stagnate the role of the teacher and the role of the learner. It does not impose from education a strategy that defines the advantages of activities that follow a single educational theory and prevents the flexibility required to face multiple situations and different individual differences between learners. There are students who prefer auditory over visual stimuli, and some of them are Individual work is preferred to join a group, so different activities are required to cover up. Attention and helps in learning the largest number of students and accommodates some of the individual differences between them (Issa A. (5: 2011.)

Recently, a lot of modern strategies and methods have emerged in teaching that concern the teacher and the student. Among these modern methods and strategies that teachers should take note of and use with their students are: (The differentiated education strategy), which takes into account the individual differences of students, and thus helps the student to improve what he learns ( Hamdan, 2018: 187)

No two disagree that students differ and are distinguished in many aspects and under multiple influences and factors, and among these aspects are readiness, tendencies, interests and abilities, and from this standpoint a new concept of teaching and learning emerged, namely differentiated education, which some educators call diversification of teaching or differentiated teaching. (Al-Halisi, 2012: 46)

The aim of this type of education is to diversify the teaching in the classroom, not only as a matter of changing the class routine as some believe, but the basis is that the students have different learning styles, some of them are (audio) and the other is (kinesthetic), and there is a third style (visual), meaning that the backgrounds of Students and their economic and social standard of living are different, as well as the patterns of intelligence they hold are

different, and there are also many factors that distinguish between students, which require the teacher to diversify the activities he uses within his classroom, which leads to more fun and mental and cognitive excitement among students. (Ambosaidi, 2018: 20)

Research and studies have confirmed that the more the teacher knows the individual differences between the students, the easier it is to train them and direct them towards achieving different educational purposes. In mental abilities, it is a difference in the degree of presence of these characteristics and these abilities. (Al-Zoubi (121: 2013

Therefore, the role of the teacher is not limited to transferring knowledge and information to the minds of the learners, but he must go beyond that to direct the learners and take into account their nature and the individual differences between them. (Al-Tanawi, 2011: 167)

The main principle of differentiated education is that education is for all students regardless of their skill level or background, and it assumes that students are different in their academic abilities, personalities, interests, background knowledge, experiences, and degrees of motivation to learn. (Abd al-Rahman, 2008: 157)

Differentiated education aims to raise the level of all students in the classroom and does not focus only on weak students in raising their achievement levels. The necessity of the teacher's knowledge of the characteristics of each student, and then the ability of the teacher to teach students in more than one way and does not depend on one method of teaching. Differentiated education is also linked to the use of teaching methods that allow diversity of educational outcomes and lesson planning and preparation according to the principles of differentiated education and determining its methods according to the teachers' competencies (Zayer et.al, 76:2014)

Differentiated education helps to focus on basic ideas and skills in each content area and the ability to respond to individual differences between students. Students of one grade, even if they are of the same age, can differ greatly in their lives, circumstances, past experiences, and

their willingness to learn, and this difference has significant impact on their learning. (Scott (2012:2

The teacher can give each student in this strategy a special activity in understanding facts and information and containing them to increase his abilities and raise his academic achievement (Ghanim, 2009: 201).

Raising the level of academic achievement is one of the important educational goals in the lives of students, which the educational system is working to improve. Challenges and problems in different daily life (Al-Shahrai 6 (38:2010

Increasing students' achievement and improving their attitudes towards learning is related to the degree of compatibility between the teacher's teaching style and the students' learning style. In many cases, a kind of mismatch occurs between the student's learning style and the teacher's teaching style, which leads to negative results for both the student and the teacher. The student feels bored and unattractive, and has negative attitudes towards the subject. In return, the teacher faces low marks from the students and may doubt his competence as a teacher by the students and the administrative system. The fewer the teacher's intent and the student's interpretation, the greater the chance of effective learning. (Abu Ataya and Abu Hamada, 2019: 278 .)

Science is one of the most important pillars of scientific and technological developments, including scientific knowledge and activities, which have an important role in the formation of the scientifically motivated individual, which is one of the most important goals of learning science in the modern era. (Abu Hasel 6 18: 2019 .)

Al-Shahri (2011) indicated that one of the goals that science education seeks is to prepare a learner who is able to build knowledge on his own according to his cognitive structure, investing all his mind's mental capabilities, and moving away from receiving knowledge in a fragmented manner and storing it for the time of need, expressing his opinion independently of the various thinking skills to communicate with

world and activate mental performances in a positive way. (Al-Shahri, 2011)

**The aim of the research:** To identify: “The effect of using differentiated education on the achievement of fifth grade students in biology in biology

**Research hypotheses:**

1- First hypothesis: there is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental and control groups in Achievement test.

2- The second hypothesis: There are no statistically significant differences at the level of significance (0.05) between the three styles (audio, visual, and kinesthetic) in the achievement test for the experimental group that was taught according to the differentiated education strategy.

**search limits**

1-The current research is limited to the fifth grade biology students in the city of Mosul

2 - the first semester, for the academic year 2021-2022 Define terms:

3- Biology book, approved by the Iraqi Ministry of Education, authored by (Prof. Dr. Hussein Abdel Moneim Daoud and others: 2018)

4- The two chapters (first and second) of the biology textbook for the fifth grade biology.

**Differential education: defined by:**

**May Tomlinson & Eidson:** The differentiated teaching approach is a systematic approach to curriculum planning and teaching for academically diverse learners. It is a way of thinking in the classroom to achieve two goals: respecting the needs of each learner individually, and maximizing each student's ability to learn. (Tomlinson, 2001:p1)

**Procedural definition:** It is a set of steps and procedures that aim to raise the level of students' achievement and learning styles.

**Collection: Known by:**

Abu Dayyeh (2011): He defined it as the sum of the skills, knowledge and values acquired by the student in a certain period of time, compared to the set of skills and the required knowledge and attitudes. (Abu Dayyah, 2011: 244)

**Procedural definition:** The researcher defines it procedurally as the level of achievement of the fifth grade biology students in biology, and it is measured by the degree obtained by the student in the achievement test prepared by the researcher for this purpose.

**Chapter tow**

Foundations of the differentiated education strategy: The basis of this strategy is that education is for all learners regardless of their abilities, level of performance or previous experience, and it assumes that the classroom contains learners They differ in the following:

- 1- Differences in the home environment.
- 2- Differences in general culture and sports.
- 3- Differences in previous experiences
- 4- Differences in academic requirements
- 5- Differences in the ways of managing the surrounding world.

**Assumptions on which differentiated education is based.**

In addition to differences that lie in their academic, motor, and physical ability, patterns of kinesthetic learning, their personalities, interests, and degrees of preparation for learning, so it can be said that differentiated education is a teaching process for learners with different abilities for the classroom. (Al-Sayeh, 2001:4)

The topic of learning styles has been of great importance because of its importance in educational studies. These studies have found that more than 75% of students' achievement depends on themselves and on the learning styles followed, and that the student takes from the teacher 25%, and this also depends on The methods that he practices in the educational process in the classroom. (Zeitoun, 2004: 13)

Where it explains the different learning styles of individuals in learning from Thorndike's point of view according to the different cultural, personal, biological and emotional factors of individuals, so the learning style is a concept or term that refers to the appropriate response of the individual to stimuli in learning contexts, and these responses to stimuli are the behaviors components that make up the individual learning style. (Hergenhahn, 1993 & Olson)

Gregor and Eutlin defined the learning style as a set of distinctive performances of the learner that represent evidence of the way he learns and receives information received from the surrounding environment with the aim of adapting to it. It appears from it that some minds perform best in physical and sensory situations, others in abstract situations, and some of the three are in the two positions together (Jaber, Quraan, 2004, p. 2).

Al-Saifi defined learning patterns as the way in which each learner begins to focus on science and to retrieve new and difficult information, and they considered that this interaction takes place in a way that differs from one person to another. It makes learning itself effective for some students and ineffective for others. (Al-Saifi, 2007: 13)

**Differentiated education is based on a number of assumptions, which are represented in the following:**

- 1- The students differ from each other in the previous knowledge, characteristics, tendencies and home characteristics from which they come, their priority in learning, and their abilities, talents, trends and methods that they learn out, and the degree of their response to education.
- 2 - The inability of teachers or teachers to achieve the level of learning required for all learners in a single teaching method.
- 3- There is no one teaching method that suits all learners
- 4- Differentiated education provides an appropriate learning environment for all learners because it is based on diversification of the modalities, procedures and activities in which

education takes place, thus enabling each learner to achieve the desired goals in the manner and tools that suit him.

5- Differentiated education is an educational system that aims to achieve the same educational outputs with different procedures, processes and tools, and its advocates see that it is difficult to ask the teacher to achieve the same goals with the same level of teaching and one teaching method with learners among whom are the differences mentioned above,

because such a requirement is unattainable and not It can actually be achieved. The differences between learners in the fields that have been mentioned. After all this, we can sum up to say that it is a teaching strategy that takes into account the characteristics of learners, their abilities, talents, and tendencies, and how they prefer learning and access to one learning outcomes with various tools and methods. (Atiya, 2009: 455).

The concept of differentiated education is related to the following:

- 1- Using teaching methods that allow for a variety of tasks and learning outcomes
- 2- Preparing and planning lessons according to the principles of differentiated education
- 3- Determining differentiated teaching methods according to the teachers' competencies (Al-Anzi et al (3: 2005).

It can be said that differentiated education stems from the work of John Dewey who advocated the idea that the way a teacher should teach should be aligned with the needs of students. (Al-Hilisi, 2011:53)

**1-2- Characteristics of differentiated education:**

- 1- It provides each student or group of students with the learning requirements that suit them
- 2- It obtains student satisfaction and acceptance
- 3- It increases students' effectiveness in learning

**Benefits of differentiated education:**

\* It works on teaching students in different styles (auditory, verbal and sensory visual and sensory)

\* Works to satisfy the desires and tendencies of students

\* Works to achieve the conditions for effective education \* Works to create an interactive atmosphere inside the classroom.

\* Works to encourage and develop creativity and innovation among students (Nasr, 2014: 46)

### **Objectives of differentiated education:**

Among the objectives of differentiated education are:

1- Develop challenging and engaging assignments for each student.

2- Providing flexible entrances to each of the content, teaching and outputs.

3- Responding to students' readiness levels, teaching needs, interests and preferences in the learning process.

4- Providing opportunities for students to work according to different teaching methods.

5- Preparing the student who can carry out various real and life tasks and unpredictable.

6- It works to achieve the maximum degree of learning for all students, taking into account the different learning styles, tendencies, abilities and trends.

7- Adds new teaching strategies for teachers.

8- Compatibility with the standards and requirements of the curriculum for each learner. (Heacox, 2001:13)

**Domains of differentiated education:** It can be done at any step of education

1. In the field of goals: the teacher can set distinct goals for students so that he is satisfied with cognitive goals for some students and analytical goals for others. In this, taking into account individual differences according to their mental levels. 2. In the field of methods: the teacher can assign some students with tasks in

self-education, such as doing self-studies, working on projects and solving problems, while assigning other students with manual work ... and so on. 3. In the field of outputs: it was satisfied with limited outputs achieved by some students, while others are required to have other, more in-depth outputs, and the teacher diversifies the methods of presenting goals according to mental disparity. (Al-Anzi et al., 2005: pg. 4).

That the previous three levels of differentiated education can be achieved, but only discrimination in goals does not achieve the purpose, because the goal of differentiated education is to provide education for all students, and this education can be achieved if students' representations and potentials are exploited, and their areas of strength are exploited to strengthen their areas of weakness.

**Example:** A student who is weak in the English language but loves sports. How can we use sports to support learning the English language?

**The solution:** (The teacher asked the student to present sports news in English by giving him a newspaper in English.

Here, we did not modify the curriculum and did not accept a low level of this student, but we focused on developing her weakness by exploiting her strengths. (Obaidat and Abu Al-Sameed, 2007, p. 121-122)

### **Justifications for differentiated education:**

Students have different abilities, interests, and motives. Providing a differentiated education for them depends on the need to know each student and on the teacher's ability to define appropriate strategies for teaching each student. There is no one way to teach, as every student comes to school with different experiences and diverse cultures from Different environments, and these differences may be the result of differences in the home environment, in culture, in experiences, in response to the requirements of the study, or in the processes of the student's ways of cognition. Hence, the justifications may be limited in general to:

1- Public education curricula.

- 2- Individual differences.
- 3- Education is a right for all.
- 4- Community development is a duty of all.
- 5- Equal opportunities for students.
- 6- Justice among students.
- 7- Balanced growth of the age group of students. (2010, fatma H)

### **The roles of the teacher and the learner in diversification of teaching:**

First: The role of the teacher:

- The teacher pays attention to individual differences between students.
- The teacher modifies the content, process, and deliverables according to the strategy used
- The teacher and students work together in a flexible manner. (Hussain, Kojak and others, (46-45:2008 .)

### **There are a range of roles for the teacher in the diversity of teaching:**

- ❖ The teacher tries to know the abilities, tendencies and learning styles of his students, and prepares for this the appropriate tools or what is available from them.
- ❖ Planning for diversification of teaching starts from the first day of school, and the teacher must explain the theory to students and parents.
- ❖ The teacher should pay attention to the evaluation and achievements of each pupil, so that he knows his needs.
- ❖ The role of the facilitator and facilitator of differentiated education through three main responsibilities that he must undertake, namely providing and describing learning opportunities in differentiated education, organizing students for the learning process, and using time in a flexible manner.(Tomlinson ,17:2005).

**Second , The role of the learner: :**

There are many roles that the learner must play in differentiated education, as mentioned by (Kojk and others). Some of these roles are as follows:

- ❖ The student must understand what is going on in the class and its goals.
- ❖ Students in Diversity Instruction processes are positive partners who have obligations to make and to guard against.
- ❖ Students have to accept the idea of difference Tasks and activity offered by our their Teacher.
- ❖ Students in differentiated teaching classes must get used to the abundance and diversity. Evaluation processes, methods and tools
- ❖ Students should enhance confidence in themselves and their abilities to achieve the work that is required of them, accept the challenge and make effort to raise their level and do not accept the level of (the average student).

### **Previous studies:**

#### **First Axis: Studies related to differentiated education:**

1.AI-Halisi Study (2012): This study was conducted in Saudi Arabia at Umm Al-Qura University / College of Education, and this study aimed to identify the effect of differentiated education on academic achievement in the English language course for sixth graders. The study sample consisted of (53) students from the sixth grade of primary school in Ammar Bin Yasir School in Al-Qunfudhah Governorate. The researcher used the post achievement test, and he used statistical means (Spearman-Brown equation, analysis of concomitant variance, standard deviation, arithmetic mean).

- The study resulted in the presence of a statistically significant difference at the significance level (05, .) in the post-achievement between the mean scores of the experimental group that studied the English language using the differentiated education strategy, and the average scores of the control group



that studied English using the traditional method, which means The use of differentiated instruction in teaching has greatly contributed to improving the achievement level of the students of the experimental group. (Al-Halisi, 2012: 2.155)

2.Taif Governorate 6 and 2- Al-Osaimi Study (2014): This study was conducted in Saudi Arabia at Umm Al-Qura University / College of Education. The sample of the study consisted of (50) students from the sixth grade of primary school. The sample was distributed between two groups, the first is experimental and the number of its members is (25) students, and the other is control (25) students. The experimental group was taught using the differentiated education strategy according to the cooperative learning pattern and the pattern of multiple intelligences. 2 The researcher used the pre-test and the post-achievement test, and the study resulted in the presence of a statistically significant difference at the significance level (0, 05) between the average scores of the experimental group that studied the standardization course using the differentiated education strategy, and the control group that studied the standardization course in the usual way.

**Chapter three**

**First: the experimental design of the research:**

The experimental design is also defined as a design based on the scientific experiment to reveal the causal relationships between the variables in the light of controlling all the factors affecting the variable or dependent variables with the exception of one factor that the researcher controls and changes for the purpose of measuring its effect on the dependent variable or variables. (Al-Jadri and Abu Helou, 2009:233)

The researcher relied on the experimental research methodology for its relevance to the nature and objectives of the current research, which is called the design of equivalent groups with two tests, pre and post tests, and the design includes two groups, an experimental group that studies according to (differentiated education),

and the control group that studies according to the usual method.

**Second: Research community: Population**

The research community was determined for all secondary secondary schools for girls, which contain the fifth biological grade, which are (22) secondary schools and (30) middle schools. The research community consisted of all the students of the fifth grade of biology in those schools, who numbered (40289), and the researcher obtained this information under the book facilitating the task.

**Third: The research sample:** It is a subset of the study population, and it contains Some elements of the study community. (Alyan et al., 2008: 126)

The research sample was selected as follows:

**First: School sample:** Mosul High School for Girls was intentionally selected, which is located in Dohuk Governorate and is affiliated with the Nineveh Education Representation for the following reasons:

1- The secondary administration showed its willingness to cooperate with the researcher, and this is necessary for the success of the experiment, as the researcher is a teacher in the same school

2- The school contains two divisions, a fifth, biological, where the researcher randomly selected the experimental and control groups, so the division was (A) control and (B) experimental division.

**Second: The female sample:** The female student sample consisted of (70) female students, with (35) female students for the experimental group and (35) female students for the control group. As shown in Table (1).

N.o. student s	Method	Class	Group
35	Differentiated education	V biology	Experimental
35	Ordinary		Control
70			Total

**Fourth: Equality of the two research groups:**

One of the conditions of the experimental research is that the members of the two research groups are equivalent in some variables for the success of the experiment, so that the researcher can demonstrate the effect of the variable The independent on the dependent variable. (Marachli, 2016: 137)

Before starting the application of the experiment, the researcher conducted equivalence between the two research groups (experimental and control) in several variables based on the literature and previous studies that the researcher reviewed. The equivalence between the two research groups was conducted in the following variables:

- 1- The chronological age of the students, calculated in months
- 2 - Education level of the parents
- 3- The educational level of the mothers
- 4 - Biology degree for the previous academic year (2020-2021)

**Fifth: Requirements for the application of the experiment:**

**1- Determining the study subject:** The researcher relied on the topics prescribed in biology for the fifth grade biology for the year (2021-2022), which included two chapters (nutrition and digestion, breathing and gas exchange). From the Iraqi Ministry of Education, as the article explains In Table (1) mentioned above

**2- Preparing behavioral objectives:**

Behavioral objectives are the basis on which the educational design process is built, as they help to plan and direct the education process by choosing the appropriate and required activities to achieve learning successfully, as well as choosing appropriate educational means, facilities and experiences to implement the curricula, and they contribute to highlighting concepts and facts. The important information that forms the structure of the study topics, as well as it guides the efforts of the teacher and

focuses them towards the goals to be achieved. (Abu Arish, 2016: 121).

Among the requirements for applying the experiment is the preparation and formulation of behavioral objectives. For this reason, the researcher formulated (45) behavioral objectives to be achieved in the teaching plan and in the achievement test. The researcher addressed the first three levels of Bloom's classification of behavioral objectives (**knowledge, understanding, application**).

The researcher presented the behavioral objectives to a number of experts in the field of educational and psychological sciences and teaching methods, to know their opinions about them. In the light of it, teaching plans were prepared

**3- Preparing teaching plans**

**Seventh: The two research tools:** For the purpose of achieving the objectives of the research, this required the preparation of the following tools:

**First,** the learning styles scale.

**Second:** an achievement test in biology.

The researcher looked at a set of measurements for learning styles, including (Dan and Dunn, 1989), the Format McCarthy model, 1985), the Gregor (93) model of average abilities, the model (Hill, 1986) of mental patterns, and the Whitkin model, 1978). Jaber and Qur'an, 2004).

The researcher adopted a scale (Jaber and Al-Qur'an, 2004), which consists of (80) items distributed into four patterns (kinesthetic, auditory, visual, verbal) for each axis (20) with alternatives (highly, moderately, weakly).

The researcher used the three styles (auditory, visual, kinesthetic) only in the learning styles scale, considering the verbal aspect is distributed on the three sides, where no one of the three styles can dispense with the verbal style. The validity of this scale. In its initial form, the scale consists of (60) items with (20) items for each style, and some items have been modified and deleted according to the experts' opinions, so the

number of items becomes (51) items with 17 items for each style.

The researcher applied the learning styles scale to the experimental and control groups on Sunday 7/11/2021. The answers were corrected and the students were divided in the light of their answers into The three styles.

In order to ensure that the students were divided according to their learning styles, the researcher re-applied the scale after a week. On the first application, the researcher obtained the same results.

**Second: The achievement test:** (Ali, 2011) defines the achievement test as: an organized procedure to measure learners' achievement of pre-defined educational goals. (Ali, 2011: 240-241)

And since the current research requires preparing an achievement test for the fifth-grade biology students for the two research groups, after completing the experiment to identify the effect of differentiated education on the achievement of fifth-grade biology students in biology, and due to the lack of a ready-made achievement test characterized by objectivity, honesty and stability, and covers the topics established from the book of biology. The researcher prepared an achievement test characterized by honesty and stability, covering the topics to be taught, and the test in its initial form consists of (40) items of objective tests. Then he presented it to a group of experts and specialists in the field of psychological and educational sciences and teaching methods, to ensure the validity of the paragraphs that make up the test in terms of their validity and comprehensiveness to the required levels.

The researcher developed the test map (specification table), which contains the number of questions for each topic from the chapters (first and second) that the researcher taught to the students for each level of objectives (knowledge, understanding, application). Thus, an achievement test consisting of (40) items was prepared, as shown in Table (2).

Table (2) Test Map (Table of Specifications)

Total 100 %	Application %20	Understanding %46	Knowledge %34	Content ratio	Number of quos tas	Content
24	5	11	8	60 %	8	F1
16	4	7	5	40 %	6	F2
40	9	18	13	100 %	14	Total

**The validity of the test:** the validity of the test is defined as: the instrument's measurement of the characteristic or characteristic that it was designed to measure (Al-Shayeb, 2009: 94). The researcher verified the validity of the test by:

1 - Apparent honesty: the test obtained a percentage (85%) or more of the experts' agreement, and no paragraph of the test was deleted. Thus, it became composed of (40) paragraphs in its final form. Thus, the apparent validity of the test was verified.

2- Structural validity: it was proven that the test items match the content of the material through the opinions of experts and through the test map presented to them with the content of the test

**The exploratory application of the test:** The exploratory application of the test aims at the following:

Indicating the extent of clarity of the test questions and instructions, determining the time taken to answer the questions, and finding the discriminatory power for each of the test items.

Therefore, the researcher chose (100) female students from the fifth grade biology in schools (Umm Al-Rabeein Preparatory School, Yasa Secondary School for Girls) to be the exploratory sample, where the test was applied to them on Thursday, 16/12/2021, and it became clear through the application that the instructions are clear and the average was calculated. The

time to answer the questions is (45) minutes, which is the appropriate time to answer the achievement test

**Correction of the test:** The researcher determined according to the correction key, and gave the test questions a mark of (1) for the correct answer and a score of (zero) for the wrong or left over answer or indicated by more than one alternative. Thus, the score of the achievement test ranged between (0-40) degrees.

### **Statistical analysis of test items:**

After completing the process of data unloading, coding, and tabulation, it must be analyzed statistically, in order to give an accurate descriptive picture of the data obtained, and to determine the degree to which can circulate The results of the research on the community from which it was taken. (Al-Abbasi, 2018: 332)

**I: Determining the coefficient of difficulty:** the coefficient of difficulty was found for each of the test items according to the difficulty equation, which ranged between that it ranges between (0.31 0.78) and this indicates that all test items are acceptable and distinct, that is, they distinguish between the higher group and the group The world. And (Allam, 2013) indicates that the paragraph whose distinguishing power is greater than (0.3) is good (Allam, 2013: 306).

**2- The stability of the achievement test:** The test was applied to a sample of (20) female students of the fifth grade biology (Dijla High School for Girls) and it took place on Tuesday 12/21/2021, then the researcher applied the Corder-Richardson equation -20 because it deals with grades (0 - one). In addition to the ease and difficulty, it was found that the degree of stability was (0.838), which is a good stability coefficient. (Al Abbasi, 2018) indicates that the stability is good if the stability coefficient is (0.7) or more (Al Abbasi, 2018: 296).

The experiment began with the implementation of the learning styles scale for the two research groups on Sunday 7/11/2021, the researcher taught the material to the students of the two research groups, (experimental), which studies differentiated education, and (control) which studies according to the usual method by itself, and the teaching continued throughout the first semester. 2021-2022) according to the pre-prepared teaching plans, and the experiment ended on Monday (1/17/2022).

### **Post-test of the two research groups:**

After completing the experiment on Monday (1/1/2022) the researcher applied the search tool (achievement test) on Wednesday (1/26/2022) after informing the students about the date Achievement test, and the researcher conducted the tests herself.

## **Chapter four**

### **First, show the results:**

(0.250-0.546), and this indicates that all test items are acceptable and valid for application, if the test is good and valid if the difficulty coefficient is It ranges between (0.2-0.8) (Allam, 2013: 307).

The ease coefficient was found for each of the test items according to the ease equation, which ranged between (0.750-0.454), and this indicates that all test items are acceptable and valid for application.

### **Discriminatory power of vertebrae:**

In order to identify the validity of the test and the clarity of its paragraphs with regard to the female students, the answers were corrected, and they were divided into two groups (27%), an upper group, which includes (54) female students, and (27%) a lower group, which includes (54) students.

The discriminatory power was calculated for each of the test items by using the discrimination equation, and after the researcher calculated the discrimination of each of the test items, he found

**I- The results of the first hypothesis, which include:** There is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental and control groups in the achievement test.

To verify this hypothesis, the researcher extracted the arithmetic mean and standard deviation of the students of the two groups (experimental and control), and then applied the second test (t-test) for two samples. independently, and the results were included as follows:

Table (3) The arithmetic mean, standard deviation, and the value of the t-test for the (achievement) test

Level indication	T value		Deviation normative	SMA	N.O students	The test
	Tabular	Calculated				
Indicate	(1.994) (68)	6.539	2.428	31.772	35	Adjuster
			3.112	36.135	35	Experimental

- ❖ Significant at an error rate of (0.05) and at a degree of freedom (68) (T) tabular = (1.994). It is clear from the above table that the arithmetic mean of the students of the control group was (31.772) and with a standard deviation of (2.428), while the arithmetic mean of the experimental group students was (36.135). ) with standard deviation (3.112)

It is also clear that the calculated t-value (6.539) is greater than the tabular t-value of (1.994) at the level of significance (0.05) and the degree of freedom (68), which indicates the existence of a

Table (15) the value of the analysis of variance test (P) for the (achievement) test for the three types (audio- visual - kinesthetic)

statistically significant difference in the (achievement) test between the experimental and control groups and in favor of the experimental group. Thus, the null hypothesis is rejected and the alternative hypothesis is accepted.

**2- The results of the second hypothesis, which includes:** There are no statistically significant differences at the level of significance (0.05) between the three styles (audio, visual, and kinesthetic) in the achievement test for the experimental group that studied according to the differentiated education strategy.

Sig. Mistake percentage	F value	Mean squares	Freed om degree	Total square s	Variables
.0000	13.857	320.235	2	640.469	Between totals
		23.110	32	739.531	Inside the totals
			34	1380.000	

\* The tabular value (q) is significant at an error rate (0.05) at a degree of freedom (2-32) = 3.295

Through the results of Table (15) it is clear that there are significant differences between the three styles of the experimental group in the achievement test because the calculated value of (F) reached ( 13.857, which is greater than the tabular value, which reached at an error rate of (0.05) at a degree of freedom (2-32) = (3.295).

In order to identify the significant differences between the patterns, the researcher used the least significant difference test : (LSD)

Table (4) shows the results of the least significant difference (LSD) test between the three types (audio-visual-kinesthetic) for the experimental group in the achievement test

Trust value 95%		Sig error rate	Skew error	Avarage difference	Patterns	Number of samples	Thr test
Maximum	Minimum						
-6.0023	- 13.5806	.000	1.86021	- 9.79144*	Visual mode	17	LSD
.3724	-8.4228	.071	2.15891	- 4.02521	Kinetic mode		
13.5806	6.0023	.000	1.86021	9.79144*	Auditory mode	11	
10.5007	1.0318	.019	2.32431	5.76623*	Kinetic mode		
8.4228	-.3724	.071	2.15891	4.02521	Auditory mode	7	
-1.0318	- 10.5007	.019	2.32431	- 5.76623*	Visual mode		

**\* Significant at an error rate of (0.05) in the results of Table (4), the researcher reached the following results:**

- 1- There are statistically significant differences in the achievement test between the auditory style and the visual style, in favor of the style Optical.
- 2- There are significant statistically significant differences in the achievement test between the auditory style and the motor style in favor of the style auditory;
- 3- There are significant statistically significant differences in the achievement test between the

visual pattern and the motor pattern in favor of the pattern Optical.

**Second: Discussing the results: The reason for the results of the current study can be attributed to the following:**

- 1- The differentiated education strategy attracted the attention of the students of the experimental group and increased their attention and concentration, because the distribution of the students into three groups according to the results of applying the learning styles scale (audio, visual, kinesthetic) in light of the differentiated education strategy helped the

weak students in biology to participate with Her classmates, which led to the creation of a spirit of teamwork and interaction among them, which increased the level of their academic achievement.

2- The students of the experimental group were more active, positive and interactive during the application of the differentiated education strategy, instead of the negative attitude in the traditional method in which the academic situation depends on the teacher, and this is due to the diversification of activities within one lesson according to the preferred learning methods for each student.

3- The superiority in achievement is attributed to the students of the experimental group who studied according to the teaching plans of the unfamiliar differentiated education strategy for the students, so they interacted with it and increased their enthusiasm for it, which helped to increase the level of students' achievement in biology.

4- The reason for the superiority of the experimental group students is to provide them with sensory data through the sense of sight; Using (images, symbols, diagrams) are the same main tools in the differentiated education strategy that the researcher used in teaching Experimental group students.

5- The researcher believes that the use of differentiated education has contributed to developing the understanding of the experimental group students by organizing and defining ideas, and realizing the links and relationships between information and concepts. whose people showed a great ability to understand Various relationships and connections.

6- The researcher can explain that the use of differentiated instruction in teaching has contributed a lot to improving the memory process of the students of the experimental group, as there were statistically significant differences between the two groups in favor of the experimental group. 7- The use of the differentiated education strategy may be compatible with the age stage, maturity level and

mental development of The students, which led to their understanding of the material.

- 8- The use of the differentiated education strategy may be compatible with the age stage, maturity level and mental development of the female students, which led to their understanding of the subject.

## Conclusions

In light of the research results, the researcher reached the following conclusions:

- 1- The positive impact of the differentiated education strategy on the achievement of fifth grade students biology.
- 2- The use of the differentiated education strategy in the classroom requires the teacher to spend more time and effort than is required of him when teaching in the usual way.
- 3- The use of the differentiated education strategy achieved diversification of the presentation of content and the use of more than one method and activity during the lesson, making the lesson interesting and renewed far away from stagnation and boredom.

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

- 1- That the Ministry of Education in its directorates train and develop biology teachers in particular and subjects in general on the use of differentiated education strategies and their activation for all stages.
- 2- Reconsidering the curriculum design in line with the requirements of differentiated education.
- 3- Introducing modern strategies in teaching, including the differentiated education strategy, in the programs of general science teaching methods that are taught to students of departments of science faculties in the faculties of education and basic education.

## Suggestions:

1- Conducting studies to identify the effect of the differentiated education strategy according to learning patterns in biology on other variables such as (creative thinking, attitude, inclination).

2- Conducting a study similar to the current research, taking into account the gender variable.

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