

## The Effect of Landa's Model on the Acquisition of Biological Concepts Among Fifth-Grade Students – Scientific Branch in Biology

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### Abstract

*The goal of the current research is to identify the effect of Landa's model on the acquisition of biological concepts in biology for the fifth scientific grade students. For the purpose of verifying the aim of the research, the researcher has developed the following null hypothesis: There is no statistically significant difference at the level (0.05) between the average grades of the students in the experimental group who study according to the Landa model and the average grades of the students in the control group who study according to the normal method according to acquire biological concepts, in addition to that, a test for acquiring biological concepts has been prepared, which consists of (45) items. The researcher has confirmed its apparent reliability by presenting it to the arbitrators. Then he has tried the test on two exploratory samples for the purpose of extracting the psychometric properties. The research experiment has been applied in the first semester for the academic year (2023- 2024), and after the end of the experiment, a test for acquiring biological concepts has been conducted, after which the students' answers have been corrected and processed statistically. The results have showed that the students of the experimental group who studied according to Landa's model outperformed the students of the control group who studied according to the usual method in the acquisition test of biological concepts.*

**Keywords:** Effect, Model, Landa, Acquisition of Biological Concepts

## INTRODUCTION

### First: Research Problem

The researcher believes that the strategies and models used in teaching biology are the most important problem in students' weakness in acquiring biological concepts, in addition to the lack of biology teachers' use of models desirable working to motivate students and stimulates them. The researcher has felt the research problem through his modest experience in teaching the subject of biology to the fifth scientific grade students for more than (24) years, and also during my work in the Specialist Supervision Department of the Najaf Education Directorate for more than (5) years, that there is a weakness in the acquisition of concepts among scientific grade students , particularly scientific fifth stage students to learn biological concepts.

I have noticed the lack of interest in modern models and theories and the limited use of the usual method of teaching that relies on memorization and indoctrination, which does not take into account the encouragement of mental abilities, which left students in a state of boredom and a decline in acquiring academic performance concepts.

To confirm this, the researcher has directed a survey questionnaire to a sample of biology teachers in the secondary and preparatory schools affiliated with the Kufa Education Department randomly selected from those whose service was not less than (10) years in teaching biology for the fifth scientific grade students.

The problem of this research is determined by answering the following question: **(What is the impact of Landa's model on the acquisition of biological concepts in Biology for fifth Scientific Grade Students).**

### Second: The Importance of Research

The scientific knowledge is currently increased as a result of rapid cultural changes and globalization revolution that were reflected in educational institutions, which imposed a new reality for scientific education to keep pace

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with these developments, in addition to deepening the teaching sciences in the stages of general education, which actually lead to the preparation of individuals capable of following up scientific thinking. (Ahmed, Aziz ,2018:502).

The current era is witnessing rapid development in all fields, especially in science and knowledge, which has led to occurring a huge development in human life and he has become more aware of what is happening around him and more understanding of the problems he faces in his daily life. This constitutes an incentive for many countries to keep pace with this scientific progress in all aspects of life. So the progress of countries is based on the knowledge they have, through which nations rise and produce. A conscious generation capable of thinking about solving all the problems facing it in correct ways, and this will not happen unless we reconsider our academic curricula. (Al-Hashemi and Attiya 2011: 15).

Teachers' competencies play an essential and huge role in term of their development, including the physical and mental aspects, which enhances learners' confidence within themselves, and stimulates thinking and creativity, as it opens the way to success (1: 2023, Abbood).

The teaching method is the teacher's approach to the behavior and attitudes of learners, more than it is a method of memorization and indoctrination, as the modern teaching method is to make the student the cornerstone of the educational process in order to improve the academic level of the student (Al-Huwaidi, 2005 ,9).

(Abbood, 2023) suggests selecting educational objectives and strategies, developing and selecting assessment tools, producing educational materials, and evaluating student performance by using learning and teaching theories (Abbood, 25, 2023)

Educators confirm and encourage diversity in teaching methods and strategies, so that the teacher becomes familiar with what is appropriate for each teaching position and subject, so scientific skill is not sufficient, but rather need to special experiences rather requires (Yousif, 2019:2902).

The process of forming concepts varies in terms of their simplicity and complexity from one classroom to another, as the process of acquiring concepts is one of the difficulties facing teachers , which requires a change in the goals of education from the process of conveying information, knowledge, and scientific facts to helping them form mental habits that enable them to live in a changeable society.( Al-Maliki , 2003)

### **Third: Research Objective**

The research aims to know the effect of Landa's model on the acquisition of biological concepts among fifth-grade scientific students.

### **Fourth: Hypotheses Objective**

For the purpose of verifying the research objective, the following null hypothesis was formulated:

There is no statistically significant difference at the level of significance (0.05) between the average grades of the experimental group students who study according to the Landa model and the average grades of the control group who study according to the usual method based on the acquisition of biological concepts.

### **Fifth: Research Limits**

Human Limit: The fifth scientific grade students in intermediate and secondary schools, Najaf Al-Ashraf Education, Department of the Holy Kufa Education Directorate.

The spatial limit: al-Fidayen secondary school for boys (day school) in the Kufa - based directorate of education.

Temporal limit: the first semester for the academic year 2023-2024.

The cognitive limit (Chapter One, Chapter Two, Chapter Three, and Chapter Four) of the Biology textbook taught to the fifth scientific grade students for the academic year (2023-2024), tenth edition of 2021 AD.

### **Sixth/ Terminology Definition**

The Impact /

Terminologically it was defined by Majeed Al Rikabi 2022 , as any positive or negative change effecting a specific topic and resulted from practicing a developmental activity (Majeed, Al Rikabi, 2022:137).

The procedural definition of impact: the researcher procedurally defines it as the amount of intended cognitive change for a specific topic as an educational outcome using Landa's model among the students of the research sample (the experimental group) as a result of their exposure to the Independent variable measured by the grade that the student obtains in the acquisition test of biological concepts

### **Model**

Terminologically defined by Arafat Zayer et al as a descriptive complete plan includes specific content or subject and be implemented and directed inside the classroom ( Zayer et al , 2017:43).

The procedural definition: The researcher defines it as a set of procedures and sequential steps used by the researcher with fifth-grade scientific students during the process of teaching the biology subject to the experimental group within the classroom in order to fulfill the goals of the research.

### **Landa Model**

The terminological definition defined by Ibrahim (2003) as an integrated plan that includes a set of procedures followed in planning Lesson that include sequential and sequential steps (Ibrahim, 2003: 23).

The procedural definition: The researcher defined it procedurally as a complete plan and sequential steps of strategies followed by the researcher in the classroom for fifth grade scientific students (Experimental group).

### **Acquisition**

The terminological definition: Al-Saadi (2020) defined it as the students' ability to comprehend the educational content during his discrimination, this ability in acquisition is measured by summing the total grades obtained by the student in the test (al-Saadi, 2020:19).

Procedural definition: The researcher defined it procedurally as the ability of students in the fifth scientific grade to define the concept, its distinction, application, and measurement through multiple objective test prepared by the researcher, consisting of (45) items, and is measured by the score the student obtains in the concepts test.

### **The Concept**

The terminological definition" It was defined by Mahood Yousif (2020) as “a word or group of words that have distinctive features or characteristics and can be generalized to countless things” (Yousif, Mahood, 2020:7).

Procedural definition: Defined by the researcher: What the students of the fifth scientific grade and the (research) sample consist of (defining, distinguishing, and applying the biological concept in Biology for the four semesters( first, second, third, fourth).

### **Theoretical Background**

Constructivism theory is considered one of the true axioms in teaching, which has gained a prominent place in educational circles. Constructivism works to employ the learner's cognitive structure in the teaching-learning process, which helps to raise the level of education in many countries of the world after employing accurate and objective teaching strategies via practices in and outside the classroom.

The concept of constructivist theory:

It is not easy to reach the concept of constructivist theory because it is linked to many of research fields, including education and philosophy in particular, so the search for a specific meaning or concept for constructivism is yet a problem. (Masoudi, Al-Mahdawi 2018 :27).

Al-Khalidi (2013) defines it as “a theory of knowledge and learning that develops through the individual’s activity in building patterns of thinking as a result of the interaction of his experiences and personal abilities (, Al-Khalidi 2013: 292).

### **Landa's Model**

The Russian scientist Lev Landa (Lav N. Lada), developed this model and holds a doctorate of philosophy from the Soviet Union. He worked at the University of Iowa and Columbia, he is president of the Landa International Foundation in New York.

It is a management and learning consulting company and has one hundred published research papers (Hamdallah, 2003:16).

### **The Concept of the Landa Model**

It is defined by Al-Adwan and Al-Hawamdeh (2011) as a model that relies on structural succession and found that the most important method in this sequence is the cumulative method that is based on a system of directions that include treatment. After which the student moves spontaneously to the subsequent educational process after mastering the first process (Al-Adwan and Al-Hawamdeh, 2011:125).

### **Landa's Classification of Basic Operations**

Landa agrees with Bruner, who believes that the learner must discover information through gradual guidance and reach the content (Rashid 2007:17).

### **Motor (skill) Processes**

These are processes through which the student can form any material thing and change the characteristics and shape of this thing. These processes can be observed by the student or another student. He can also know the extent to which he has mastered the skill and obtained the necessary information about it.

### **Cognitive (Mental) Processes**

These are processes by which the student can make a change in the material thing that has been created and which are involved in several movement processes, and the teacher and student cannot observe them, because he has a sufficient amount of knowledge and therefore the learner can change concepts, perceptions, principles, theories and ideas, and these variables are specific to his assumptions: (Landa, 1980: 168-171).

### **Teaching Steps According to Landa's Model**

The teaching steps were determined according to Landa's model in four basic stages, which consist of several strategies:

Directed Discovery: Directed discovery generally works to reach something that existed before but was not known to the discoverer and therefore it differs from invention or innovation.

Patterns of discovery learning vary according to the nature of the guidance that the student receives from the teacher. These patterns were mentioned by Ibrahim (2009) and are as follows:

In this type, the teacher presents the problem to the student while providing all the guidance necessary to solve it clearly and in detail, and the student implements this guidance. This type of discovery is considered guidance and it is desirable for teaching to be away from thinking, and it also requires training on any equipment and tools.

Undirected discovery: The teacher prepares all the necessary laboratory tools and equipment, and directs the student to search for a solution to a specific problem without guidance from the teacher. This is the highest type of discovery, but it is taken into account that it needs Long time and high equipment (Ibrahim, 2009: 154)

Expository Teaching. These are the old ones and the most widely used. There is hardly any teaching method that is devoid of a theoretical presentation of the scientific subject without explanation and clarification. This method is based on principle of direct delivery, explanation or presentation to discuss without discussing the students. The teacher performs indoctrination, transmission of information, explanation and gradual transition according to the students' abilities and capabilities. The student receives this information and calmly records his observations. (Asmaa Abu Sharkh, 2017 :18).

The entrance to pairing between them

It could integrate between the directed discovery and method of explanation so that the learner discovers and analyzes knowledge and organized it according to a structure where the teacher compares and matches what the students have achieved in the guided discovery stage, and what he explained and clarified in the explanation and clarification stage. Here comes the role of the teacher to motivate and encourage the students who have achieved knowledge in the correct manner, and he must rectify mistakes that the students made to avoid them in the coming times. ( Asmaa Abu Sharkh, 2017:32).

### **Snowball**

In this stage to close the lesson, and the aim is to consolidate the information and concepts that the students reached in the guided discovery stage and the teacher explained during the explanation and clarification stage in order to preserve and retain them (Reigel, 1999: 350).

Acquiring Concepts, Introduction to the Concept: Concepts are the basic elements of knowledge, and their importance has increased at the present time more than ever, due to the explosion of knowledge and the expansion of its branches, due to the difficulty of being familiar with the aspects of any branch of it, so it has become the teacher's concern to help the student to assimilate the conceptual material structure and its logics ( Maraae and Mohammed , 2009:211).

### **Forming Concepts**

The process of forming and comprehending concepts depends on the learner's ability to understand the secret of the relationships that exist between a large group of facts, information, and things. Learning concepts also helps him organize the educational situation in a specific pattern, and this reduces the ambiguity and complexity of the educational situation. Understanding the relationships between concepts Understand and recognize the results it helps to acquire skills (Jawal 2007 :568).

It can be said that a concept consists of a group of elements that distinguish it from others, which are:

The name of the concept, symbol, or term, and it indicates what the concept belongs to and what it denotes, such as the Photosynthesis representation chemosynthesis ( Qatami et al ,2008:568).

The significance of the concept: It is the definition that expresses the concept (specifying the meaning of the name, symbol, or term), such as saying that the cell is the unit of structure and function in the body of a living organism (Zaytoun, 2004: 79).

Examples of the concept (positive that belong to the concept and negative examples that do not belong to it). Each concept has examples that apply to it. They are called positive examples, such as Paramecium that belongs to the phylum Protista, while Amoeba does not belong to the phylum Primitives (an example of negative examples) (Al-Teeti, 2007: 82).

The distinctive characteristics that all members of the concept category refer to are known as distinctive characteristics or distinguishing features, such as birds: their bodies are covered with feathers. (All concept category)

The value of the concept (Ambo Saidi and Sulaiman, 2011:87).

## Acquiring Concepts

The process of acquiring concepts is one of the main goals that educators seek to achieve through different educational situations and at all stages, as the task of acquiring concepts constitutes a major part of the learning process within the classroom, as teachers continuously teach new concepts to students whose methods of presenting them vary until Variation may occur among the same teachers in presenting two different concepts for one class (Saeed, 2008: 67.)

## Biological Concepts

Biological concepts represent mental perceptions in the form of words, names, or symbols for a specific idea that could be reached to through the processes of defining, distinguishing, and applying those biological concepts (Al-Agha, 2007: 570).

## Factors Affecting the Learning And Acquisition Of Biological Concepts

The results of educational studies and research in teaching science indicate that there are some difficulties in teaching and acquiring scientific concepts, due to the variation in the scientific concepts themselves in terms of their types, simplicity, complexity and abstraction. Among the difficulties in learning scientific concepts, are listed below:

The nature of scientific concept.

Confusion in the meaning of the concept or its verbal connotation.

Lack of the learner's scientific background (culture).

The difficulty of learning previous scientific concepts necessary for learning new scientific concepts.

Number of examples: The more examples a concept has, the easier it is to learn (Zaytoun, 2008: 82).

## Research Methodology

### First: Experimental Design

In this research, the researcher adopted the design of the experimental and control groups (controlling each other)

The design is suitable for research purposes, and the table explains this design:

**Table of experimental design for research**

Group	Two groups equivalence	Independent variable	Dependent variable	Dependent measurement variable
Experimental	- Testing previous information	Landa model	Acquiring biological concepts	Test of acquiring biological concepts
Control	- Previous education	Normal method		
	- age multiplied with months			
	- Intelligence test			

### Second: Research Population

The research community in the intermediate and secondary schools of the day school consists of students of the fifth scientific grade in the General Directorate of Education of Najaf Al-Ashraf / Department of Education of Holy Kufa for the academic year 2023-2024.

### Third: Research Sample

It means part of the society: A group of individuals with same characteristics and descriptions conform to those existing in the society (al-Jabiri et al 2011:245).

The school in which the experiment is being implemented was chosen intentionally, because it is within the geographical area: the school administration cooperated with the researcher, it has four classes for the fifth scientific grade, all the school students are from one geographical area and are close in social and economic level, which made it easier for him to choose the school intentionally. Accordingly, the Al-Fedae secondary School for Boys was chosen to be the research sample after the approval of the General Directorate of Education in Najaf Al-Ashraf, according to the letter of facilitation to implement the experiment. This letter of facilitation was issued by the General Directorate of Najaf Education to the Al-Fedae secondary School for Boys, and after visiting the school, an agreement with the school administration was reached to conduct the experiment on its students. The school consists of four classrooms for the fifth science grade (A, B, C, D) with a number of (133) students. The classrooms were chosen randomly, and paper clips for the classrooms were placed in a bag and two clips were withdrawn for Division (1) to represent the experimental group, and the number of its students was (34) students, and Division (C) to represent the control group, and the number of its students was (33) students. Number of students were excluded due to failure, and the number of the experimental group students was (30) and the number of the control group students was (31)

### Fourth: Equivalence of the Two Research Groups

The two research groups were equal in terms of the number of variables, as in the following table:

Variable	Group	Arithmetic mean	Standard deviation	T-test		Significance at level 0.05
Age	Experimental	17.4516	4.37294	1.726	2.00	Statistically insignificant
	Control	19.3000	3.97536			
Intelligence test	Experimental	66.7742	11.65250	0.969	2.00	Statistically insignificant
	Control	69.5333	10.52987			
Previous information test	Experimental	200.6774	3.74510	1.403	2.00	Statistically insignificant
	Control	202.4000	5.67876			

### Fifth / Control Procedures

A- Internal validity of the experimental design:

The following procedures were taken- :

**Experiment conditions and accompanying accidents:** The students in the experimental and control groups were not exposed to any accidents that hinder the conduct of the experiment and that may affect the dependent variables (acquisition of biological concepts) in addition to independent variable.

**Experimental extinction (abandonment of the experiment)** refers to the accidents that a sample of students are exposed to during the course of the Experience (Abbas et al., 2009: 176).

The experiment in the current research did not involve any student dropout, interruption, or transfer from one section to another that would require the attention of the researcher or the school administration.

**Maturity:** During the experiment period, some physical, psychological, or mental changes may occur, and these changes had no effect on the research experience because the students in the research sample were at the same age level, and since any growth occurring in any aspect of biology, psychology or mental health, this growth includes all students.

### External Soundness of The Experimental Design

The researcher was keen to reduce some of the side effects that might affect the conduct of the experiment, including:

Confidentiality of the research experiment. The confidentiality of the research experiment was maintained through agreement with the school administration and the teacher, that students should not be informed that they are part of an experimental research sample.

The academic subject: The students of the research sample (both groups) were taught the same content of the academic subject, which consists of four chapters from the Biology textbook for the fifth scientific grade, ninth edition of 2021.

Teaching aids: The same teaching aids were used for both groups, such as textbooks and colorful pens, blackboard, drawings, and some educational models.

Duration of the experiment: The time period of the research experiment was equal for the two research groups, as it began on the following day Wednesday, 18.10.2023 AD, and ended on Tuesday, 9.1.2024 AD.

Place of the experiment: The experiment was implemented in a unified manner for the two groups in Al-Fedae secondary School for Boys, in cooperation with the school administration, and the biology laboratory in the school was allocated to conduct the experiment therein, so the two groups had the same conditions in terms of lighting, seating, etc.

Classes and their distribution: The scheduled classes for biology for the fifth scientific grade were three classes per week for each group, and it was agreed with the school administration that the times of these classes would be as close as possible.

## **Sixth: Research Requirements**

### **Determine the Content of the Scientific Material**

The researcher determined the scientific material that would be studied during the implementation of the experiment for the experimental and control research groups according to the content of Biology course represented in the following four chapters: nutrition and digestion, respiration and gas exchange , excretion , movement) from the Biology textbook for the fifth scientific grade students , ninth edition of 2021, represented by the following chapters :

Chapter One: Nutrition and Digestion.

Chapter Two: Respiration and gas exchange.

Chapter three: Excretion

Chapter Four: Movement

### **Choosing Biological Concepts**

After the researcher identified the scientific material represented by the first four chapters of the biology book to be taught for the fifth grade scientific students for the year 2023-2024, the researcher identified the main and sub-concepts by analyzing the chapters.

The biological concepts (15) main concepts and (66) sub-concepts were extracted, where it was presented to a group of arbitrators and specialists in the field of teaching methods and those specialized in measurement and evaluation.

To verify its reliability and the accuracy of its formulation, the researcher used the (Cooper) equation, and its accuracy rate (80%) was approved.

### **Formulating Behavioral Objectives and Determining Their Levels**

The researcher set (225) behavioral objectives according to Bloom's classification The first is (remembering, understanding, application, analysis, and evaluation)

### **Preparation of Teaching Plans**



Teaching plans were prepared for the two research groups, including (24) teaching plans that fit the independent variable Landa model (Nada) on the experimental group and the usual method on the experimental group.

## **Seventh: Research Tool**

A tool to test the acquisition of biological concepts was built as follows:

### **Determine the Test Objective**

This test aims to measure the extent to which students in the research experience acquire biological concepts for fifth scientific grade students in the first four chapters of the Biology textbook, ninth edition for the year 2021.

### **Preparing Test Items**

The type of objective tests, specifically multiple choice, was chosen because it is not affected by the subjectivity of the person who correct them.

It is suitable for all students in terms of individual differences, is also characterized by high validity and consistency, and includes all parts and objectives.

The basis of the multiple choice question must be precise and clear, and the alternatives must be consistent about the same topic (Abdul Hadi (2002: 57-64)

After defining the objectives for the study material, identifying the main and subsidiary biological concepts included therein, and formulating the behavioral objectives, which amounted to (223) behavioral objectives covering the cognitive field of Bloom's taxonomy, test items were prepared that measure the extent to which the students of the two research groups acquired the concepts included in the study material. Three test items were approved, to measure each main concept consisting of (defining the concept, distinguishing the concept, and applying the concept). Thus, the test items amounted to (45) multiple choice test, and four alternatives were identified for each testing item

### **Preparing Test Instructions**

#### **Test Instructions**

Instructions for answering the test were prepared, which include general information about the student and how to answer the items through an illustrative example and giving an idea of the purpose of the test. After preparing the test items in their initial form and instructions for answering the test, they were presented with a list of the main and subsidiary biological concepts on a group of experts and specialists in Biology sciences and science teaching methods.

#### **Instructions For Correcting the Test**

Model answers to the test items have been prepared for the purpose of correcting answers. The marking system has been adopted on the basis of (1,0) for each test item. A score of (one) is given for the correct answer, (zero) for the wrong answer and therefore, the total test score becomes (45degrees)

Test reliability: Construct reliability, also known as concept validity, refers to the test's ability to measure the hypothetical concept adopted in its construction, through an abstract comparison between the test scores and the concept on which it was based (Al-Kubaisi, 2010: 267).

#### **Apparent Reliability**

It means the general appearance of the test, including the type and wording of the items, the accuracy of the instructions, and the extent of the suitability of the test for its intended purpose. The test was presented with a list of main and subsidiary concepts to a number of experts and arbitrators in the methods of teaching science,

education, and psychology, an agreement rate of (80%) was approved based on their opinions, some items have been amended based on their opinions with the aim of reaching to the final version of the paragraphs.

## **Content Reliability**

The content reliability was confirmed by extracting the concepts contained therein, and it was presented to a number of arbitrators in the fields of biology, methods of teaching science, education, and psychology, as the test included (45) items, thus, content reliability was achieved.

## **Exploratory Application of The Test**

### **First Exploratory Sample**

The test was applied to a sample of (35) students from the fifth scientific grade at Abdullah bin Abdul Muttalib Preparatory School for Boys affiliated with the Directorate of Education of Najaf Al-Ashraf / Department of Education of Holy Kufa on Wednesday 3.1.2024, after an agreement with the school administration and the subject teacher and ensuring their completion of the study material for the first four semesters. They were notified of the test date a week before taking it, and the researcher supervised the application of the test himself, and for the purpose of ensuring the clarity of the test instructions, the clarity and appropriateness of the items, and determining the time required for the test, it became clear that the average time taken to answer the test items is (40) minutes, by calculating the average time by recording the time of finishing answering the test by taking the first five students and the last five students.

Average time - answer time of the first five students + answer time of the last five students

### **The Second Survey Sample**

The goal is to choose the second survey to analyze the data statistically and to ensure that the paragraphs takes into account individual differences among students in terms of ease, difficulty, and ability to distinguish between students with different abilities and students with weak abilities. To verify this, the test was applied to a second exploratory sample, chosen randomly from the research community and from other than its basic sample, consisting of (110) fifth- scientific grade students in Al-Ghadir secondary School for Boys (morning study) affiliated with the Najaf Al-Ashraf Education Directorate / Kufa Education Department.

### **Difficulty Coefficient for the Test Items**

The main goal of calculating the difficulty coefficient is to know the percentage of students who answered the paragraph correctly and those who answered incorrectly (Majeed and Yassin, 2013: 30)

### **Discrimination Coefficient of Test Items**

What is meant by the discrimination coefficient of an item is the degree that distinguishes high-achieving students from low-achieving students

Achievement in the test: High-achieving students answer the paragraph correctly, while low-achieving students answer the paragraph incorrectly (Allam, 2011: 245).

### **The Effectiveness of The Wrong Alternatives**

The wrong alternative is considered effective when it attracts the largest possible number of weak students (the lower group), to be the correct alternative, although the wrong alternatives attract the small number of the high group, so, the value of all alternatives will be negative. (al-Kubaisi, 2007-184).

The researcher calculated the effectiveness of each incorrect alternative using the equation of the effectiveness of incorrect alternatives, it was found that the coefficients of all alternatives are negative.

## **Test Stability**

Test reliability means the true score students get on a test or scale, even when it is re-applied to them more than once, under the same conditions as the first time, and the degree here must remain constant and not change ( Yousif, 2018:20).

The reliability of the test has been calculated using the Keuder-Richard equation (20), as its reliability value was (0.89), which is a good and high reliability coefficient, as (Odeh 1998) indicated that the acceptable reliability coefficient is (0.65) (Odeh, 1998: 255). Accordingly, all test items were kept and it was ready to be applied to a sample research.

## **Interpretation of Results**

The students of the experimental group who studied using Landa's model outperformed the students of the control group who studied according to the usual method in testing biological concepts, and the researcher attributes the following reasons:

Landa's model distinguishes between knowledge and skill, where the direction of the model is cognitive, and it is a model that emphasizes linking previous knowledge with modern knowledge, which makes learning meaningful.

The student is able to retrieve information, interpret it, use it in new situations, and integrate previous knowledge with a new one by revealing their conceptual structure in an organized manner and clarifying the relationships between them. Thus raising their cognitive level, increases their acquisition of biological concepts.

Landa's model makes the student the focus of the educational process, which has a significant impact in making the student more active, positive and effective in the learning process.

## **CONCLUSIONS**

In light of the results of the current research, the following can be concluded:

Landa's model is consistent with educational trends that make the learner the focus of the educational process.

Teaching biology to the fifth scientific grade students using Landa's model made students more eagerness and interest in the lesson from teaching in the usual way.

## **Recommendations**

The researcher recommends the following:

Employing Landa's model as a model for teaching at all intermediate, secondary, and university levels and for all subjects.

Inserting Landa's model into the vocabulary of the teaching methods course taught to students in colleges of education, with an explanation of the main steps in preparing them for the teaching profession.

Employing Landa's model in teaching biology due to its good effectiveness and clear positive impact on acquiring biological concepts.

## **Suggestions**

In continuation of this research, the researcher proposes to conduct research into the effect of Landa's model on academic achievement in physical science, Chemistry, computers and mathematics) at different stages of education

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