

## The Effect of the Zimmermann Model on the Perceived Self-Efficacy of the Fifth Scientific Students

**Abdul-Rahim Abdul-Karim Kazem Al-Tamimi**

**Assistant Prof. Dr Shaima Abbas Shaml**

**Prof. Dr. Fatima Abdel Amir Al-Fatlawi**

University of Baghdad / College of Education for Pure Sciences - Ibn Al-Haytham

Department of Life Sciences - Methods of Teaching Life Sciences

[dmo769qr@gmail.com](mailto:dmo769qr@gmail.com)

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### Abstract

The aim of the current research is to find out the effect of the Zimmermann model of the fifth scientific students on their perceived self-efficacy, and for the purpose of verifying the goal of the research, the researcher puts the following null hypothesis. There is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who study according to the Zimmermann model and the control group students who study according to the usual method in the scale of perceived self-efficacy they have.

In order to verify the validity of this hypothesis, the two researchers conducted an experiment that lasted a whole semester for the academic year (2020-2021), where the researchers approved the experimental design of two groups, one experimental and the other with partial control and the post-test of the scale of perceived self-efficacy.

The research was limited within its limits to fifth-grade scientific students at Salah al-Din al-Ayyubi School for Boys affiliated to the General Directorate of Education in Baghdad, Rusafa al-Aula, for the academic year (2020-2021 AD). When the research sample reached (63) students, and Division (A) was the experimental group consisting of (32) students and Division (B) was the control group consisting of (31) students, the two research groups were rewarded with a number of the following variables (chronological age in months, achievement Last year, previous information, a measure of perceived self-efficacy), the research tool was prepared, which is a measure of perceived self-efficacy, which consisted of (30) items, and the validity of the tool was verified after it was presented to the arbitrators, and the data was analyzed and processed statistically by adopting the statistical program (spss).

The results showed that the experimental group students who studied according to the Zimmermann model outperformed the control group students who studied according to the usual method in the perceived self-efficacy scale. Based on the results of the research, the researcher recommended the necessity of adopting the Zimmermann model in teaching biology for the scientific fifth grade because it has a positive effect on the perceived self-efficacy of students .

**Keywords:** The Zimmermann model, self-efficacy.

### The problem of the Research

Perceived self-efficacy is one of the most prominent factors affecting perseverance and performance of the learner, and the idea of this competence appears in the form of ideas, beliefs and the self, about the extent of its adequacy and through perceived self-efficacy we can predict the academic achievement of learners if it is high or low and that the high level is a clear indication of educational integrity. It is one of the keys to success that learners possess in achieving psychological, social and academic harmony to face the challenges and problems that hinder their way, on the other hand, that perceived low self-efficacy indicates the need to strengthen the learners 'experiences in order to raise their level of competence, because its decline leads to difficulties that hinder their way in their daily life. Which affects their academic and social compatibility, and from the foregoing a feeling is generated by the researcher through his practice of teaching for the preparatory

stage and his teaching of the biology course as it is necessary to reveal the level of perceived self-competence among students of the fifth science in one of the schools affiliated with Rusafa by answering the following question:

### **What is the effect of the Zimmermann model on the perceived self-efficacy of the scientific fifth students?**

#### **The importance of the research**

The educational process, through teaching systems, seeks to provide learners with experiences, knowledge and information that will develop their mental abilities, motor skills and social aspects, thus enabling them to subsequently adapt to the array of accelerating changes on the one hand and work to develop their society on the other hand. The impact of teaching is hardly limited to the learners' acquisition of knowledge and information only. Rather, education must have an effective role in this matter because it represents the intended organized action aimed at transferring knowledge and developing human capabilities and striving for it in the path of perfection in all respects and throughout life. (Hamshari, p. 19, 2007).

In the past, education focused on one aspect only, which is the cognitive mental aspect, unlike modern education, as it represents a process of developing an integrated personality that is balanced in all physical, mental, emotional, moral and aesthetic aspects, and its ability to adapt to the modern environment. (Abu Shaira, p, 17, 2009).

That is why the interest in self-organized learning strategies has emerged as an urgent necessity in the digital age in which we live in, as the learner who is able to self-organize his learning can upgrade his skills through this organization, and therefore the importance of self-organized learning has increased with the increasing uses of technology in education, where the effectiveness of this depends. The use of the learner's own ability to learn, and that the use of self-organized learning includes providing the learner with basic competencies necessary for the in-depth study of various courses (Ibrahim, p. 120, 2013).

As a result, the use of self-organized learning models is essential for students to achieve their success in primary, secondary and higher education schools due to the importance of self-organized learning in performance, which is the Zimmermann model. (Sitzmann Ely, 2011).

Perceived self-efficacy is one of the most important psychological concepts that Bandura (1986) came up with in social cognitive theory to study its role in self-organized learning and raise the level of academic achievement of learners. It is the essence of human strength. Actions and behaviors better than low self-efficacy learners, as they increase the level of performance and help the learner withstand pressures and obstacles. (Bandura, p. 122, 1986).

As it makes the learner choose the task that suits him, given that there is a close relationship between the confidence that the learners feel in their abilities to perform a specific task and their choice to practice this profession. (Randhawa & others, p. 41, 1993).

It also does not focus on the skills that the learner possesses only, but also on the capabilities of the learner and his potential to employ these skills. Success does not require technical and cognitive skills only, but also requires the learner's belief in his ability to control events to reach the desired goals. (Bandura, p. 54). Which appears in the form of ideas and beliefs about the self and the extent of its efficiency, and according to its cognitive nature, that self-efficacy mediates the individual's knowledge and skills and his actual performance, and these beliefs emerge in the extent to which they affect the initiation's behavior and the amount of effort exerted to perform performance according to its motivational nature, in addition to affecting the level of perseverance. And the determination to do the job. (Qatami, p. 97, 2014).

#### **Based on the foregoing, the importance of the current research is reflected in the following:**

1- Experimenting with the Zimmermann model is a new attempt in the teaching of science to break out of the traditional methods of teaching it at the level of our local environment.

2-The importance of the preparatory study stage, considering that it is an important stage undergoing psychological, social and physiological changes that contribute to preparing students for the university education stage, and this is why teaching was carried out according to the Zimmermann model of biology.

3- Knowing the perceived self- efficacy of students, which is an important factor in increasing students 'achievement and their ability to perform their life tasks and face problems and overcome them

4-This study may be an addition to a new theory for the Iraqi library, for the benefit of researchers and curriculum makers.

### **Objective of the research**

The current research aims to identify:

The effect of the Zimmermann model on perceived self-efficacy of the fifth scientific students.

### **The tow hypothesis of the research**

For the purpose of verifying the goal of the research, the following null hypothesis has been formulated:

There is no statistically significant difference at the level of (05.0) between the mean scores of the experimental group students who study according to the Zimmermann model and the average scores of the control group students who study according to the usual method in the measure of perceived self-efficacy in them.

### **The limitation of the research**

The current research is limited to:

1- The human limit: fifth-grade scientific students

1- Spatial limit: one of the preparatory schools (government daytime) for boys and affiliated with the General Directorate of Education of Rusafa Al-Awwal in the center of Baghdad governorate (Salah El-Din Junior High School).

2- Time limit: the first semester of the academic year (2020-2021).

3- Knowledge limit: the first semester, the second semester, the third chapter, the fourth chapter of the biology textbook to be taught for the fifth grade of the biological sciences for the academic year 2020-2021.

### **Terms of the study**

#### **First: Zimmermann model**

(Panadero, 2017): "It is a cyclical phases model of self-organized learning characterized by its three stages: the thinking phase, setting goals, performance phase, and self-evaluation phase". (Panadero, p. 3, 2017).

#### **Second: Perceived Self-Efficiency:**

1- Bandura (1997) defined it as: "the judgments that individuals make on their abilities, to organize and accomplish actions that require the achievement of clear types of performance". (Bandura, p. 123, 1997).

### **Chapter Tow**

#### **Theoretical Background and Previous Studies**

##### **Social cognitive theory**

This theory is considered the link between behavioral theories and cognitive theories, as the philosophy of this theory is based on acquiring the desired behavior for learners in a social context, because this theory believes that such behaviors are easier to acquire than behaviors that do not conform to values and habits and the traditions of society, where Pandora, founder of the theory of social learning, points out that the behavior of the learner does not result from internal forces alone, nor from environmental influences alone, but rather results from the complex interaction between internal forces and environmental influences, and these internal processes are based to a large extent on the individual's previous experiences, where Pandora recognized the triple reciprocal determinism, meaning the existence of interaction and influence between the environment, behavior and the person (Jaber Abdel-Hamid, p. 430-442, 1990).

### **Fundamentals of the theory**

#### **The first basis**

the social learning theory emphasizes the deterministic continuous interaction of human behavior and its personal and environmental determinants form an interlocking system of interacting and reciprocal influences so that none of them can be given a distinct position.

#### **The second basis**

behavior is not affected by environmental determinants only, but the environment is partly a product of individual treatment. Therefore, people exert some effects on their behavior patterns through their approach to the environment, and then people are able to think, innovate, and employ their cognitive processes to address environmental events and facts.

#### **The third basis**

knowledge plays a major role in observational social learning, and knowledge processes take the form of a symbolic representation of ideas and mental images, and it controls the behavior of the individual and his interaction with the environment as it is governed by them. (Military, p. 225, 2012).

### **Assumptions of the Social Learning Theory**

- 1- A learner can learn by observing the behavior of others
- 2 -Learning is an internal process that results in a change in behavior
- 3- Cognitive processes play a crucial role in determining what we want to Learning is an internal process that results in a change in behavior. (Al-Atoum & others, p. 121, 2014).

### **The second axis: The Zimmerman model**

Self-organized learning is a purposeful, active and multi-dimensional process that emphasizes the student's freedom to assume responsibility for his own learning, as the student is seen as the active participant and responsible for his ideas to achieve his goals. As the learners set their educational goals, then they try to monitor, organize and control their cognitive, motivational and behavioral characteristics and guide them and present their goals. (Al-Hussainan, p. 12, 2010).

Self-organized learning is also a process through which learners manage their own experiences and develop effective communication skills. It strengthens the link between the teacher and the learner, as they share characteristics that indicate that they are self-organized, such as setting goals, monitoring the learning process, noticing failure, taking advantage of errors, with feedback about the learning process, and they have great flexibility to modify their behaviors according to the requirements of the learning conditions. (Al-Hailat, p. 66, 2015).

Self-organized learning may contribute to increasing the learners' efficiency to face the problems that hinder their learning and make the learner show more awareness of his responsibility to make learning meaningful and monitor his own performance. (Nasir al-Din, p. 17, 2018).

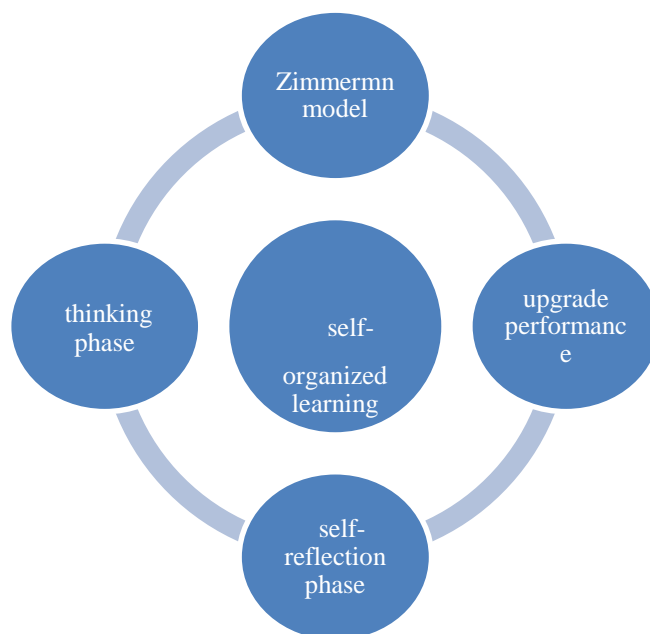
Self-organized learning also works on processing, organizing and understanding information by organizing learning and the learner's positivity and his practice of cognitive activities directed towards the educational goal. (Mabruk, p. 2, 2020).

### Theoretical interpretation of self-organized learning in light of social cognitive theory

Although there are several different theoretical approaches to explaining self-organized learning, the researcher focuses in this part on the theory of social cognitive learning by Albert Bandura, which tried to explain the self-organized learning of academic educational skills inside and outside the school. Where the current research discusses the Zimmermann model, which is one of the main models in self-organized learning, which was built according to the concepts of Pandora's social learning theory.

Where Pandora believes that cognitive self-regulation means the ability of learners to control their own behavior, so learners have the ability to control their behavior, and self-regulation becomes when the learner has his own ideas about what the appropriate or inappropriate behavior is, and he chooses actions accordingly. The motive for the human personality. (Zimmerman, p. 13, 2000).

One of the most famous models of self-organized learning is what Zimmermann and his colleagues postulated in the years 1986 and later, and it is one of the innovative models that was built in light of the theory of social learning, which deals with the principle of triple reciprocal determinism of Pandora, which assumes that the subjective, environmental and behavioral factors operate separately but are internally dependent upon The interaction of the learner with academic tasks (Zimmerman, 1990). He explained that behavior consists of external stimuli, self-sources, and learning as a result of these variables. (Bofiq, p. 70, 2013).



As this model depicts the self-organized learning processes periodically in three phases consisting of pre-thinking (before the task), performance (during the implementation of the task) and self-reflection (after the completion of the task) where the thought processes affect the performance processes and the performance processes affect the processes. Think periodically. (Bryan, p. 1, 2017).

Figure (1) Zimmermann's three-phase periodic model (prepared by the researcher)

### **The phases of the Zimmermann model:**

#### **First: The Scout phase**

It precedes the real performance and refers to the processes that precede the actual performance phase and includes the task analysis and self-motivation where the task analysis means setting goals and planning for them. Learners with high self-organization will set high-level goals (zimmerman2000) and choose appropriate strategies for their learning (Rashwan, p. 16-17. 2006).

#### **Second: the performance phase**

the processes that occur during learning and are determined in self-control and self-observation. Self-control means applying strategies to ensure success during the pursuit of goals and self-observation refers to cognitive self-monitoring and self-recording of events during the task in order to assess progress in the goal. (Zimmerman, p.711, 2006).

#### **Third: The self-reflection phase**

Is a post-stage stage in which the learner evaluates the results of his effort and his satisfaction with performance, and includes processes of self-judgment and self-reaction, and consideration of causal explanations for the level of performance and the learner may adjust his goals in the future according to the stage of thinking. (Al-Hussainan, p. 116, 2017).

The researcher believes that these three phases of the Zimmermann model give a progressive, integral framework for self-organized learning, in a simplified and comprehensive manner, leading as a result to the development of learning in order to achieve the desired goals.

### **Stages of the Zimmermann model**

**1 - The preparation and planning stage:** in which the goals to be achieved from the learning process are determined or set well and the time and effort required for the learning process is set up and knowledge is stimulated.

**2- The performance stage:** in which the task is executed and the self-questions answered, the various dimensions of knowledge, self-observation, and self-registration are organized, and the focus is on the organization and control of knowledge, motivation and behavior.

**3- Control and regulation:** in which the student intends to monitor achievement in achieving goals and adapt strategies to suit the conditions obtained. This stage includes arranging information, stimulating motivation and controlling the educational environment.

**4- Self-evaluation:** in which the student judges the reflection of the performance and the learning outcomes that he has achieved, and according to which he reviews the learning conditions to be applied in the subsequent planning stages that he will follow to complete the learning steps. Putting it into the learning process and the student may search for the causes of the errors that occurred in it and develop causal explanations for those errors in order to avoid them. (Al Safi, p. 57, 2015).

These four stages of self-organized learning are the processes that many self-structured learning models share, such as the Zimmerman model and the Pintrich model. (Al-Raddadi, p. 30, 2019).

### **Self-structured learning strategies as defined by (Zimmerman & Matrch pons 1986)**

<b>Self-structured learning strategies</b>
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1	Recitation strategy	7	Self-follow strategy
2	detail strategy	8	Academic Aid Strategy
3	Organizing and transforming strategy	9	An information search strategy
4	Planning strategy and goal setting	10	Record-keeping strategy
5	Self-monitoring strategy	11	Time management strategy
6	Environmental structure Strategy		

In conclusion, the researcher sees that the use of self-organized learning strategies included in the Zimmermann model may play a major role in the life of learners through the integration of learners with the content of the learned material and thus the acquisition of knowledge and also the issuance of judgments and independence that the learner follows while performing the educational task.

**Perceived self-efficacy:**

The concept of perceived self-efficacy is one of the important concepts in the life of the learner and his psychological well-being, as this concept is one of the most prominent concepts presented by (Bandura1977) trying to confirm the role of social and cognitive factors and the interaction between them. (Bandura, p. 15, 1996).

As the concept of perceived self-efficacy is one of the concepts that occupied a major position in determining human behavior and strength, as it affects patterns of thinking, behavior and emotion, so the higher the self-efficacy, the higher the achievement. (Al-Jubouri & Al-Taraihi, p. 37-38, 2016).

In addition, self-efficacy affects multiple aspects of the learner’s behavior, such as choosing the activities in which he thinks he will succeed, and avoiding activities that he thinks he will fail in performing, depending on his beliefs about his self-efficacy, learning and achievement. Individuals with a high sense of self-efficacy tend to learn and achieve compared to their counterparts with a low sense of their self-efficacy, and self-efficacy affects exerting more effort and determination to achieve their goals, while individuals with a low sense of self-efficacy tend to be lazy and spend little effort in achieving their goals. (Al- Raqad, p. 297, 2017).

**Sources of perceived self-efficacy**

There are four sources through which the learner can acquire self-efficacy, namely:

**1-Effective performances**

They are the most influential source for creating a strong sense of self-efficacy, as successes build a strong belief by learners of their effectiveness in contrast to the repeated failures that weaken this belief. (Bandura, p. 79, 1997).

**2- The psychological and physiological state**

The physiological and emotional state affects the self-efficacy of the learners and the various areas of mental, cognitive, sensory and nervous functions, as the learners rely on their physical and emotional states to judge their abilities. (QUEK, p. 28, 2018).

### 3- Alternative experiences:

Modeling strongly affects the belief in self-efficacy, through the influence of learners with perceptions of similarity to (Bandura, p. 26, 1982).

#### Social persuasion

This source refers to processes of encouragement and support from others, so that learners can be verbally persuaded about their abilities to achieve important achievements in their academic life. (Qatami, p. 305, 2005).

Accordingly, the researcher believes that while teaching his students the Zimmermann model, he will emphasize these resources and invest them for the purpose of achieving success and raising the level of perceived self-efficacy in them by emphasizing effective performance and monitoring achievement.

#### The relationship of self-efficacy with self-organized learning

where (Pajares 2008) identified the relationship between self-efficacy and self-organized learning strategies, as represented by a positive reflexive effect on each other, as he noted that learners who have higher beliefs about their self-efficacy often use self-organized learning strategies. Conversely, the use of these strategies can lead to an increase in self-efficacy beliefs. (Joan M, p. 27, 2014).

Zimmerman 2000 refers to the relationship of self-efficacy with the Zimmermann model that pre-thinking processes affect performance control processes, which in turn affect self-evaluation processes and with the completion of this loop model Zimmerman believes that self-efficacy beliefs within this self-system take an important role, especially in the pre-thinking phase, so learners Those with high self-efficacy are more motivated and more flexible when they face challenges during their learning. (Zimmerman, p. 17, 2000).

**Dimensions of self-efficacy:** Pandora identified three dimensions that self-efficacy change according to which they are:

**1- Magnitude:** It varies according to the nature and difficulty of the situation, and the differences between learners in competency expectations. This dimension is determined as Bandura refers to the difficulty of the situation and clearly shows when the tasks are arranged from easy to difficult, for example performing the task in difficult circumstances or easy circumstances (Bandura 1977).

**2- Generality:** This dimension refers to the transfer of competence from a situation to similar situations. The learner can succeed in performing educational tasks compared to his success in performing similar educational tasks. A specific activity or task. (Al-Zayyat, p. 510, 2001).

**3- Strength:** Bandura stresses that the strength of the learner's sense of self-efficacy expresses high perseverance and high ability that enables the selection of educational activities that will lead to success. (Boksara, p. 30, 2015).

Table (1) of previous studies

Studies of the Zimmermann model							
Researcher's name, the school year and country	The aim of the study	Dependent variable	Scholastic stage and the size of the sample	The methodology used	tools of the study	The results of the study	



1	Sudanese study 2017	it aimed to know the impact of instructional design according to the strategies of a to learn self-regulating in the acquisition of science subject Biology and Life skills for middle school students.	Attainment Life Skills	(60) Student from Female students of the class Middle Third Indeed (30) Student of the group Control and (30) student for the group Experimental	The experimental method	Achievement test and measuring life skills	studied due to the educational strategies showed results The group students excelled Which experimental I studied according to learning Self-regulating on students of the control group that studied according to the usual method
2	Dhafer study 2019 Iraq	It aimed to know the effectiveness of the Zimmerman model in achievement and the motivation for learning physics for Fifth students	Cognitive achievement learning Motivation	(67) Students from Fifth scientific students Bio and reality (33) A student of the group Control and (34) for the group Experimental	The experimental method	Achievement test Measuring of motivation for learning physics	The superiority of the experimental group who were studied With self-organized learning According to the model Zimmerman on students Control group that I studied the way The usual level of achievement Scholastic and motivational
<b>Studies of perceived self-efficacy</b>							

3	Al-Shabool Study, 2004 Jordan	It aimed to investigate the impact of management strategies on perceived self-efficacy and control center A sample of students with high and low achievement in the higher basic stage	perceived self-efficacy.	the study sample was formed Of (102) students distributed a picture Randomize into three groups Equal two experimental groups and a control group of 17 One of the talented students and 17 students Of students Non-gifted for each group	experimental curriculum	A measure of a Perceived Self-efficacy	The results showed that there are statistically significant differences in scores on the perceived self-efficacy scale Between the three groups.
2	The Alwan Study, 2012 Iraq	It aimed to identify the perceived self-efficacy of Baghdad University	perceived self-efficacy	The sample size was (300) students, of whom (150) were males And (150) female	descriptive curriculum	The scale of the subjective Perceived Efficiency	The results showed the existence of statistical differences depending on the gender variable and in favor of the males, while the results showed the existence of statistical differences according to the variable of specialization and in favor of the scientific specialization.

Chapter Three

## Research Procedures

### Research methodology

The experimental approach is based on an intentionally controlled change of the specific conditions of an event while noting the changes occurring in the same event and its interpretation (Melhem, p. 422, 2006). According to the nature of the current research variables, the researcher chose the experimental approach.

**Research procedures:** This chapter will present an overview of the research

**First: The experimental design:** The two researchers adopted the partial-controlled design of the experimental and control group and the dimensional scale of perceived self-efficacy, as shown.

Table (2) The experimental design

Group	parity	Independent variable	dependent variable	Measuring the dependent variable
Experimental	chronological age Previous control achievement	Zimmermann model	Perceived self- efficacy	Perceived self-efficacy scale
Control	Previous knowledge of biology. Perceived self-efficacy The Zimmermann model Perceived self-efficacy scale Perceived self- efficacy	The usual way		

### Research community

The current research community consists of fifth-grade scientific students in the governmental secondary and preparatory schools of the General Directorate of Education in Baghdad, Al-Rusafa 1, except for the distinguished schools for the academic year (2020-2021).

### The research sample

It is part of the research community. The two researchers chose the sample intentionally, and after The researcher obtained the official approvals represented in the book Facilitation, so the researcher chose a numerical (Salah al-Din for boys) intentionally from among the schools, to represent the research sample. The two divisions (A) and (B) were chosen from the three divisions of the fifth grade of scientific students according to the experimental design of the research by simple random identification, Division A represented the experimental group, the number of its students (32) students, and Division B represented the experimental control group and the number of its students (31) students.

**Second: Control procedures:** The two researchers performed equivalence procedures for the two research groups, in order for the results of the experiment to be attributed to the independent variable and not to other exotic variables, and this was done as follows:

**The internal integrity of the experimental design (equivalence of the research sample):**

The two researchers conducted parity between the two research samples in the chronological age variables which is as follows:

**a- Age in months**

The researchers rewarded the two groups in terms of chronological age in months, based on the special data on the school card.

**b- Testing of the previous knowledge in biology**

The researcher prepared a test consisting of (30) items of the multiple choice type, and it is one of the objective tests, the aim of which is to know what the members of the research sample possess from previous information in the biology subject of the research topic. The results were extracted as shown in Table (3).

**c- Previous achievement of biology course**

The researcher equated the two groups in the previous achievement variable in biology in the first semester of the academic year (2020-2021) AD, and the researchers obtained the students' final grades in the first semester of school books.

**The scale of the Perceived Self-Efficiency**

The scale was applied to the two research groups for the purpose of parity by the two researchers, after correcting the answers of the experimental and control groups and calculating the scores for each of them as in Table (3).

Table (3) the equivalence of female students of the research sample in previous knowledge, previous achievement, chronological age, and the measure of perceived self-efficacy

variable	Group	number	the arithmetic mean	the standard deviation	degree of freedom	T-value		the significance level, 0,05
						computed	Tabular	
chronological age	Experimental	32	195,625	4,079	61	0,913	2,00	Not functional
	control	31	196,774	5,789				
Previous knowledge	Experimental	32	13,969	2,670	61	0,892	2,00	Not functional
	control	13	13,419	2,187				
Previous achievement	Experimental	32	63,375	9,465	61	0,191	2,00	Not functional
	control	31	62,935	8,782				

self- efficacy scale	Experimen tal	32	52,187	5,070	61	0, 565	2,00	Not functiona l
	control	31	51, 419	5,702				

### The external safety of the experimental design

It represents all the circumstances and accidents that may occur during the application of the experiment, except that the application of the experiment was not accompanied by any accident that affected the results of the application of the experiment, due to the good planning and cooperation of the school administration with the researcher and from these variables are:

**1-Teaching:** The tow researchers studied the two groups (experimental and control) to reduce the effect of this factor according to the teaching plans that were prepared for each group.

**2- Educational Material:** The members of the two research groups (experimental and control) were taught the same subject, which includes the four chapters), the first chapter (nutrition and digestion), the second chapter (breathing and gas exchange), the third chapter (the excretion), the fourth chapter (the movement) from the book, "Biology for the fifth grade of science edition 8, which is scheduled for fifth grade students in Iraqi schools for the academic year (2019).

**3- Duration:** The duration of the application of the experiment was equal for the experimental and control groups, which is the first semester of the academic year (2020-2021).

**4- The distribution of weekly classes and their number:** The experiment was applied two days a week in attendance, at the rate of two sessions per week, with the electronic application of three sessions for both groups.

**5- the secret of experience:** The researcher agreed with the school administration to keep the experiment confidential.

**6- Exhaustion during the experiment (Experimental Extinction):** There was no loss among the students of the research sample during the application of the experiment, except for the absence of some individual students and almost equal between the two groups according to these current conditions that the country is going through due to the pandemic (Covid-19).

**7- Maturity:** The maturity factor had no effect on the application of the experiment, because the duration of the experiment was the same for the two groups.

**8- Place The Experience:** The researcher was keen to apply the experiment to the experimental and control groups in classrooms prepared for the same conditions.

**Research Tool: Perceived Self-Efficiency Scale:** The researcher has adopted the following steps to build the perceived self-efficacy scale, which are as follows:

Steps to build the scale.

Determining the objective of the scale.

The scale aims to measure the perceived self-efficacy, which is appropriate for the age stage of the fifth grade students.

**1- Identifying Areas of the Scale:** After the researcher reviewed the literature and previous studies and the opinions of experts and referees in the methods of teaching science,

measurement, evaluation and psychology, the two researchers prepared the self-efficacy scale relying on it.

**Formulation the items of the scale:** After the researcher examined a number of measures that were used to measure perceived self-efficacy, including (Al-Shaboul, 2004) and (Alwan, 2012) educational and psychological literature and previous studies related to it, the number of items of the scale reached about (30) items.

### **Correction of the Scale**

For each item of the scale three alternatives were placed for the answer, applicable to it (always, sometimes, and rarely), and the scores were distributed (1,2,3), respectively, for the positive and inverted items, and they were in degrees (1,2,1), respectively, and in light of this, the highest grade students obtain is (90) and the lowest score is (30).

**2- Validity of the scale:** In order to achieve the validity of the scale, the two researchers adopted two indicators of validity:

#### **a. Face Validity**

The scale was presented to a group of specialists in the field of educational and psychological sciences and methods of teaching sciences, and some items were appropriately modified to make the scale in its final form, and the opinions of the arbitrators agreed on the validity of the scale items by 80%.

#### **• The first exploratory application of the scale**

To reveal the clarity of the instructions for the scale items and the response time, the test was applied to a random sample of (38) students from Abu Alaa Al-Maari School for Boys. Students, the students did not ask fundamental questions about the method of answering and the scale items, and on this basis, the clarity of the items and instructions was ensured.

#### **• The second exploratory application of the scale**

The statistical analysis sample was chosen from fifth-grade scientific students in Al-Sayyab High School and Al-Mutanabbi Secondary School for Boys, affiliated to the General Directorate of Education in Al-Rusafa Al-Aula, whose number is about (150) students. After unpacking the data, the sample scores were arranged in descending order, then the upper and lower groups 'scores were taken by 27% from the highest and the lowest, then the following statistical analyzes were performed on the two groups:

#### **• The Discriminatory Power of items**

The T-test was applied to two independent samples to test the significance of the differences between the upper group and the lower group for each item. The T-value was considered an indicator to distinguish each item by comparing it with the tabular value at the level of significance (0.05) and the degree of freedom (80), which was (2.00). It was found that all the items are distinct.

#### **• Construction validity (Internal Consistency)**

This type of honesty is achieved by finding the correlational relationship between:

**• The relationship of the item score to the total score of the scale:** The correlation of the items with the total score is an indicator of the truthfulness of the items. The researchers used the Pearson correlation coefficient to extract the correlation coefficient between the scores of each items and the total score of the scale , Since the forms subject to analysis in this way were (150) forms, which are the same forms that were subjected to statistical analysis, and it

was found that all correlation coefficients are statistically significant at a level of significance (0.05) and degree of freedom (148), as the tabular value of the correlation coefficients was (0.161).

**Stability of the scale:** The stability of the scale was extracted by the Cronbach alpha method, and the reliability coefficient was (0.84), which is a good parameter that gives evidence of the homogeneity of the scale.

**The scale in its final form:** The scale consists in its final form after verifying the conditions of its validity and validity of (30) items and was applied to the research sample.

#### Chapter Four

#### Findings and Their Interpretation

#### The presentation of results for the perceived self-efficacy variable

For the purpose of verifying the null hypothesis, which states that: (There is no statistically significant difference at the level (0.05) between the average scores of the experimental group students who study according to the Zimmermann model and the average scores of the control group students who study according to the usual method in the scale perceived self-efficacy).

The two researchers applied the perceived self-efficacy scale on the students of the experimental and control groups, they extracted the students 'scores on the scale in both groups, and then the arithmetic mean and the standard deviation were calculated and the calculated and tabular T value of the scores of the students of the experimental and control groups were extracted The results were as shown in Table (4).

Table (4) the results of the T-test for the difference between the mean scores of the two groups (experimental and control) in the Dimensional Perceived Self-Efficiency Scale.

Group	no	Arithmetic Mean	Standard Deviation	(T) value		Function Level 0,05
				calculated	Tabular	
experimental	32	67,250	5,168	6,542	2,00	Statistical function
Control	31	58,032	5,997			

The results showed in Table (4), that the calculated T value and its value (6,542) is greater than the tabular value whose value is (2.00) at the level of significance (0.05) and the degree of freedom (61), and this means that there is a statistically significant difference. Between the average degrees of academic achievement for students of the two groups (experimental and control), and in favor of the experimental group, thus rejecting the null hypothesis and accepting the alternative hypothesis.

**The magnitude of the impact of the Zimmermann 's model on perceived self-efficacy:** After the arithmetic mean, standard deviation and the calculated T-value were extracted between the experimental and control groups in the dimensional perceived self-efficacy scale,

the ETA-square equation was applied and the effect size was (0.41). Therefore, the effect size of the model in perceived self-efficacy has a high impact for the experimental group.

### **Second: Explanation of the results**

The results in Table () showed a statistically significant difference between the scores of the two research groups (experimental and control) in the perceived self-efficacy scale in favor of the experimental group. This means the superiority of the experimental group students who studied according to the Zimmerman model over the control group students who studied according to the usual method, and the researcher can attribute the reason for this to:

1- The process of setting goals is considered an essential stage of the Zimmermann model in that it motivates learners to choose appropriate educational activities, all of this enhanced their perceived self-efficacy, so the mere feeling of the learner that he is able to achieve his goals will increase his perceived self-efficacy (Pretz & Zimmerman 2009).

2 - That students' practice of self-learning strategies during learning leads to raising their self-efficacy in performing the educational task, which improves their achievement in the course. (Zimmerman 2002).

3- The Zimmermann model is one of the important models that helped learners to regulate their behavior, monitor and evaluate their own thoughts and emotions, develop their plans, make predictions (expectations) about results and evaluate them. These abilities led to a positive effect on the self-efficacy of self-organized learners.

### **Conclusion**

In light of the findings of the research, the researcher concluded the following:

- That the Zimmerman model has a positive effect on the perceived self-efficacy of the fifth scientific students.

### **Recommendations**

In light of the results of the current research, the researcher recommends the following:

1. The necessity to train teachers of biology on self-organized learning models and methods, including the Zimmerman model because of its importance in raising the level of their perceived self-efficacy.
2. Preparing training programs for teachers in Iraqi universities that include how to teach according to self-organized learning strategies.

### **Proposals**

To complement the current research and in line with his goal, the researcher proposes the following:

- 1- Conducting a study similar to the current study on the effect of the Zimmerman model on biology at different school stages and for both sexes.
- 2- Conducting a comparative study between the Zimmerman model and teaching models, and identifying their effect on perceived self-efficacy.

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