

The Impact of Marzano`s Third Dimension ‘Extending and Refining Knowledge’ on Students’ Reading Comprehension

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Abstract

The present study aims at identifying the impact of Marzano's model of reading comprehension on fifth-grade/ High school Iraqi students; and measuring the change(s) in fifth grade students' understanding of English language as a result of using Marzano's model. Marzano's model is a modern curricula in teaching because it represents an integrated framework for the organization of learning outcomes. It can be used in various grades to improve the teaching and learning process.

Results showed that the level of the experimental group which was taught according to Marzano's model of teaching did better than the control group which was taught in the traditional way. There were statistically significant differences at the achievement level, in the literal level of reading comprehension, in the inferential level of reading comprehension, and in the critical level of reading comprehension between the scores of the experimental group and the control group.

Keywords: Marzano's learning dimensions, reading, comprehension, impact

المستخلص

تهدف هذه الدراسة إلى التعرف على تأثير نموذج مارزانو في الفهم القرائي على الطلبة العراقيين في الصف الخامس /العلمي. ويقيس التغيرات في فهم طلاب الصف الخامس للغة الإنجليزية نتيجة استخدام نموذج مارزانو. يعد نموذج مارزانو منهاجاً حديثاً في التدريس لأنه يمثل إطاراً متكاملاً لتنظيم مخرجات التعلم. ويمكن استخدامه في مختلف المراحل لتحسين عملية التعليم والتعلم.

وأظهرت النتائج أن مستوى المجموعة التجريبية التي كانت تدرس وفقاً لنموذج مارزانو للتعليم كان أفضل من مستوى المجموعة الضابطة التي كانت تدرس ضمن الطريقة التقليدية. كانت هناك فروق ذات دلالة إحصائية عند مستوى الإنجاز، وفي مستوى الحرفي

للفهم القرائي، وفي مستوى القراءة الاستنتاجية ، وفي مستوى القراءة التحصيلية بين درجات المجموعة التجريبية والمجموعة الضابطة.

1. Introduction

Although the Ministry of Education in Iraq has integrated English within the syllabus from first primary school to sixth secondary school, the task of teaching English is first and foremost the responsibility of English teacher, so that he has to master methodology of teaching, beside modern strategies of teaching English. Despite the fact that fifth grade students have spent many years of learning English, they still seem to be unable to master understanding English completely. According to a long experience of working as an EFL teacher, the researcher has found that students have weakness in reading comprehension; this might be due to using of the traditional methods of teaching in which they concentrate on teacher's role rather than students' role.

From the researcher's point of view, teachers should follow new ways or styles in teaching; they have to be aware of modern strategies and techniques in which they focus on the importance of the role of students. In this regard Marzano states the following "we live in an era when research tells us that the teacher is probably the single most important factor affecting student achievement-at least the single most important factor that we can do much about" (Marzano, and Pickering, 2003: 1). In this respect Marzano, (1992:7) adds that reviews of more than thirty years of research on the learning process has resulted in presenting a model of classroom instruction called dimensions of learning. Arredondo, etal, (1995: 74) state that Marzano's model includes five types or dimensions of thinking;-

- Positive Attitudes toward learning
- Acquisition and integration of knowledge
- Extending and Refining of knowledge
- Using knowledge meaningfully
- Production Habits of mind

The present study aims at identifying the impact of Maranon's model of reading comprehension on fifth-grade/ High school students; measuring the change(s) in fifth grade students' understanding of English language as a result of using Marzano's model; and identifying

whether fifth grade students revealed evidence of understanding reading comprehension.

2. Research Questions

- Are there statistically significant differences in the reading comprehension skill, between the scores of the experimental group who were taught following Marzano's model and the scores of the control group who learned in the traditional way?
- Are there statistically significant differences in the vocabularies, grammar and reading comprehension, between the scores of the experimental who were taught following Marzano's model and the scores of the control group who learned in the traditional way?

3. Research Design & Methodology

The researcher used a quasi-experimental approach based on two sets of design (the study group and the comparison group) to gauge the impact of the independent variable on the dependent variables. They were tested after using the Marzano's model to keep learning in studying the material the English language (independent variable) on reading comprehension (the dependent variable). Based on consultation of people of expertise and competence in methods of scientific research, the researcher found that the most appropriate approach for this study in the light of the hypotheses and their variants is a semi-experimental-based approach on the pretest and posttest for the two designs (the study group and the comparison group), the pre-test on the study group and the comparison group application.

The study population includes Fifth Grade / High School Students at the Directorate of Education Anbar Province for the academic year 2015- 2016, where they are studying a course (English for Iraq). The study group was taught in accordance with Marzano's model to keep learning while the comparison group was taught in the traditional manner. After the end of the allocated time duration of the experiment an achievement test was applied on the two groups to see the impact of the independent variable on the dependent variable.

4. Previous Studies

Different studies have been conducted to explore the validity of Marzano's model. Tarleton's study (1992) was intended, to find out the effect of the model in improving the learning process and the development of thinking. Dujari's study (1994) aimed to find out the effect of the use of the second and third dimensions of Marzano's model in achievement in science among students of the Faculty of Environmental Sciences in the United States. Al-Baaly's study (2003) study aimed to show the effect of using Marzano's model on achievement and attitude to world English language among secondary class students in the rhetoric subject. Abu Bakr's study (2003) aimed to measure the effect of using Marzano's model in the secondary school students' achievements in the Sultanate of Oman for the eloquence and attitudes towards it, the researcher chose a sample of 48 students from the second grade secondary students, and divided it into experimental groups and control group. Fatehallah's study (2010) aimed to gauge the effect of Marzano's model in the conceptual understanding and develop some mental habits for the sixth grade of primary education students in Saudi Arabia. Makhzoumi and Batayneh's study (2012) aimed to explore the effect of using the Marzano's model for learning in the development of reading comprehension skills among primary school students. Haji's study (2013) aimed to identify the impact of Marzano's model in the achievement of fourth high school students in literary texts.

5. Constructivism Theory

Marazon's model is based on a constructivist philosophy which asserts that previous knowledge is required for individuals to store and use it through interaction with the change of the world around them. Through constructivism theory the focus shifts from the external factors affecting students' learning such as: (the school, the teacher and the curriculum) to the internal factors (such as motivation, positive, and the ability to handle information). The constructivist theory is a model of learning, whose common goal is to build learners' knowledge through linking learners' past experience with actual present experience, so learning will have meaning. (Faryadi, 2009: 17). While others view that constructivism is a theory of learning based on

knowledge building through previous experiences, it concentrates on the learner through interaction with the teacher and constructivist learning environment.

Constructivist theory is "about facilitating the learner to go beyond simple recall (memorization) to ward understanding, application and competence constructivist theory indicates cannot be achieved without actively engaging the learner" (Flynn and et al, 2004: 113). The role of the teacher in this theory is "to assemble required resources and active as a guide for students to formulate their own goals and learn themselves" (Richardson and et al, 2009: 104).

Prior knowledge doesn't confine on information related to school only, it shares sociocultural habits in this connection. Constructivist theory is based on assumption that the previous knowledge including student`s interest and attitudes diversify, the focal point of learning in which students can build their own understanding, through interaction inside cultural and social environment.

6. Dimensions of Learning (Marzano's Model)

Robert Marzano and others presented an instructional model that has grown in the light of cognitive learning research results and called it the Dimensions of Learning Model. This model can be used by teachers in kindergarten through the end of high school, and the ultimate goal of the model is that students become equipped with the ability to develop themselves in a manner making them able to continue to learn throughout their lives.

Marzano`s model is a modern curricula in teaching because it represents an integrated framework for the organization of learning outcomes. It can be used in various grades to improve the teaching and learning process (Marzano et al, 1998: 10). Marzano and others state that "Dimensions of Learning is a comprehensive model that uses what researchers and theorists know about learning to define the learning process. Its premise is that five types of thinking—the five dimensions of learning—are essential to successful learning. According to Marzano et al, (1997: 4), the dimensions framework will help to:

- 1- Maintain a focus on learning
- 2- Study the learning process

- 3- Plan curriculum, instruction, and assessment that take into account the five critical aspects of learning.

Guenther defines Marzano's model as "a model for classroom instruction based on five of thinking involved in learning. The five types, or dimensions, of thinking describe what happens in the mind of a learner from the time the learner first enters a learning situation on the time that the knowledge to be learned from that situation is fully developed (1997: 7).

It is an educational framework based on the best of what researchers and educators know about learning. This Model consists of five learning dimensions which are the general framework of this model. Marzano wanted to submit to the teacher the gist of ongoing efforts and results accumulated in the field of methods and modalities for effective teaching currently being used and what had drawn research and theories about how to learn and build ideas about the teaching-learning process (Marzano, 1993: 21).

The dimensions-of-learning model reflects three basic theories in the educational interaction. These theories reflect the best of what is known about learning and translate this knowledge into instructional classroom model that directly affects how teachers plan for learning. Marzano describes the model as a teaching classroom model includes how lesson planning, implementation and design of the curriculum or the performance evaluation of students, which is based on the interaction between the five dimensions (Marzano et al, 2000:7).

Marzano and his colleagues have benefited from the educational science in the field of cognitive psychology and learning over thirty years of learning and thought processes. They formulated the theory of education and translated it into educational model that includes five styles of thinking experienced by the learner while he/she is learning. These dimensions of learning are as follows (Arredondo, etal, 1995: 74):

- 1- Positive Attitudes toward learning
- 2- Acquisition and integration of knowledge
- 3- Extending and refining knowledge
- 4- Using knowledge meaningfully
- 5- Productive habits of mind

Marzano believes that the dimensions of learning do not function in isolation or linear system but rather in the form of an interactive pattern. They occur in the context of students' perceptions and attitudes that either develop or inhabit learning (Dimension No. 1), and the use of productive habits of mind (Dimension No. 5). If students have negative attitudes and perceptions they will learn little. Similarly, students with positive attitudes and perceptions will learn more and learning will be easier, as well as using habits of mind will facilitate learning, and vice versa. Dimensions (1 and 5) are important factors in learning process. They constitute a strong background of the model. Marzano (1992: 9) focused on several key assumptions. These are:

- Instruction must reflect the best of what we know about how learning occurs.
- Learning involves a complex system of interactive processes that includes five types of thinking the five dimensions of learning.
- What we know about learning indicates that instruction focusing on large, interdisciplinary curricular themes is the most effective way to promote learning.
- The K-12 curriculum should include explicit teaching of higher-level attitudes and perceptions and mental habits that facilitate learning.
- A comprehensive approach to instruction includes at least two distinct types of instruction: one that is more teacher-directed and another that is more student-directed.
- Assessment should focus on students' use of knowledge and complex reasoning rather than on their recall of low-level information.

7. Dimension No. 3 Extending and Refining Knowledge

Learning does not stop with the acquisition and integration of knowledge. Learners develop in-depth understanding of the process through the expanding and refining knowledge to clarify misunderstandings, and reach to conclusions. They do thorough analysis of what they have learned through the application of thinking

process that will help them expand and refine the information (Dunkle, 2012: 68).

Learners extend and refine knowledge when they continue the learning process. Learning process is not an easy issue; it needs more than filling our minds with skills and contents. Effective learning occurs when learners broaden the important knowledge, so they can use it in all life situations and in school, since the learning process requires not only memorization or reading information students learned before (Marzano, 1992: 9). Expansion of knowledge helps the individual to store information in memory after the transition from short-term memory into long-term memory, and connect them to the information on to him. Marzano and his colleagues assert the necessity of asking various open-ended questions that require students to think analytically thinking which leads to change, develop and reorganize knowledge. (Marzano and etal, 1998: 123)

There are eight thinking processes teachers can use to help students extend and refine their knowledge. People use these processes unconsciously on a daily basis by comparing, classifying things. Students in general have the ability to learn and use the processes of thinking but, older students need less efforts than the younger ones (Marzano etal 1997:114 -115).

- 1- **Comparing:** Comparing helps students to make connection between factors, like characters, theme, setting (place and time). Through this process students can change roles. They can talk about differences and similarities between characters' lives and their own lives. This activity is beneficial, as it provides students opportunities to associate information in the text with previous reading (Willis, 2008:137-138).
- 2- **Classifying:** People often use this process in every day live. Marzano simply defined it is" the process of grouping things that are alike into categories based on their characteristics" (Marzano, 2007: 65). It is a process of assembling things into categories, the most important phenomenon is making rules in which categories consist of classifying occurs in steps starting with identifying units to be classified, and identifying the rule that describes the relationship of these units to one class, and the reclassification in the light of these rules. It is an essential

process of cognitive activity, an important analytical tool and enhances the learner to determine direct and indirect characteristics and attributes (Marzano, 1998: 72).

- 3- **Abstracting:** Marzano et al, (1997: 114) define abstracting as "Identifying and articulating the underlying theme or general pattern of information". Marzano, (1990: 76) suggests that teachers have to use questioning strategy during the process of teaching to develop this dimension of learning. And this questioning should be classified inside the activities like comparison, classification, induction, deduction, analysis of errors, building and supporting evidence, abstraction, and analysis perspective. The process of abstraction represents of displaying the main ideas or representation of information through graphic symbols (Marzano, 2000: 50).
- 4- **Inductive reasoning:** Inductive reasoning is "the process of inferring unknown generalizations or principles from information or observation" (Marzano et al 1997: 138). It is getting the principles and unknown generalizations from principles, observations or known analyzes. It is one of the core activities of the high mental processes and a good tool to expand knowledge. This process is used spontaneously by most of us in everyday life. (Marzano et al, 2001: 169). "A student makes an induction when he concludes that the teacher is in a bad mood because she slammed her book down on the desk after she briskly walked into the room" (Marzano, 1992: 78).
- 5- **Deductive reasoning:** Deductive reasoning is "the process of using general students to come conclusion about specific information or situation" (Marzano et al, 1999: 146). The reader moves from the general to specific he draws a specific conclusion from general premises (Mligo, 2016: 11). Deductive reasoning is important it can be used to make everyday decisions. Deductive reasoning starts with known facts and uses logic to reach final decision. The goal of deductive process is to prove that our conclusion is true (Framan and Rash, 2015: 31-14). Deductive reasoning "involves making an inference from information which is given" (Evans, 2014: 6). Learners in this

process make inferences that may not be deductively valid, by going beyond the information given (Goswami, 2011: 399).

6- Constructing reasoning: It is the process of providing support for students. It is required to take action in order to influence or persuade others for specific position. This process requires an ability to use persuasive techniques and understanding of the information needed to build up a powerful argument. Students through this process can extend and refine knowledge if they successfully understand and use persuasive techniques (Marzano et al, 2011:160).

7- Analyzing errors: "Analyzing errors is the process of identifying and articulating errors in thinking. Stated more simply, it is the process of finding and describing errors in thinking" (Marzano et al 1997:168). It is a process of defining and identifying errors, whether on individual's or others' thinking (Ermolayer et al, 2013:265).

8- Analyzing perspective: Analyzing perspectives is the final type of extending and refining knowledge in dimension of learning. It represents determining stances or positions on issues and the reasons behind them. Values people hold constitute their perspective towards issues. This process largely relates to material of a conflict or an argument. An example of this process is talking about abortion according to their values two persons may have different opinion about abortion (Marzano, 1992: 98). It involves "identifying and articulating personal perspectives about issues" (Dean et al, 2012: 56). It is the ability to observe information from perspectives other than his or her on (Tileston, 2011: 66).

8. Reading Comprehension

Reading comprehension is an axis of reading process people seek to achieve it to improve their learning process, it is the ultimate goal of the reading process, as the reader employs while reading a lot of organization and comprehension, analysis, synthesis, evaluation and criticism, connectivity and conclusion and generalization operations. If the reader does not understand or comprehend what he reads, he no longer reads. Reading is not only the process of decoding; it includes

some mental aspects as well. Tizon points that "reading ability plays a central role in the teaching and learning success at all educational stages". Thus, having any difficulty in this skill will result in variety of consequences on all subjects of study (2013: 252).

There have been different views concerning what levels there are for reading comprehension. These are literal, inferential, and critical. The following is an explanation of each level.

- 1- **Literal level (Reading-the-lines):** This is simplest and lowest level of reading comprehension as it involves precisely understanding what is on the page or reading each line. (Davis, 2006: 65). It refers to the process of directly stating information from the passage or a story. Information within this level comes from the text itself (Brassell and Rasinski, 2008: 17). "He or she can tell you the name of the main character and what he does for living, because that information is stated explicitly in the text". (Westwood, 2008: 32). Literal comprehension enables students to make inferences and draw conclusions. It includes student's ability to recognize main idea, details, sequence of events.
- 2- **Inferential level (reading between lines):** Inferential level refers to the reader's ability to inter into the depths of the text to extract meanings and to identify the deep comprehension. Making inferences remains the core of the reading effectively. It means reading between lines. Readers also can go beyond the words on network strips. Most of students face difficulties with inference simply because they lack ability to comprehend inferring, this is why they use literal level only (Polette, 2011: 83). In order to comprehend the state of the main character whether he is angry or not, according to what he does or says in this case a reader have to use information effectively to infer cause and effect and predict what is going in the passage. (Westwood, 2008: 32)
- 3- **Critical level (reading beyond the lines):** A reader at this level endeavors to make liking between the facts clearly stated in the

written text and author's intention to judge and evaluate the accuracy, trait's character and credibility of what he has read.(Al-Jubori, 2003: 16). It "involves evaluating the information in the text relative to what it means to the reader and relative to the intentions, expertise ,and or perspective of the author" (Scanlon, Anderson and Sweeney, 2010: 268). Critical level requires the reader to use previous knowledge to present judgment, opinions on ideas or appraise the written materials (Romero and Romero, 1985: 66).

Readers read for a variety of purposes and interests. Hence reading is a set of skills that involves making sense and deriving meaning from the printed word. The reading process subsumes different skills:

- 1- **Scanning:** Readers usually scan a text to get specific or pieces of information and keep on scanning until they obtain the information they want, however their reading will dedicate on a part of the text, for instance, looking for a number in telephone book. Scanning involves moving the eyes rapidly over the pages. We don't have to read all the words in the text, we only concentrate on specific words to find out the information related to our concern. This process can help readers to identify words faster. In addition to that, we can move the eyes quickly on pages.
- 2- **Skimming:** It is a process of quickly moving the eyes over the text to get only the main idea or general survey of the content (Hasan, 2015: 4). "In skimming the reader goes through a text quickly, not noting every word but trying to get the main idea of what the text is about" (Nation, 2009: 70). Skimming is reading for a main point (gist), sometimes it is called reading for general understanding .It occurs when a reader looks quickly through books in a library to choose suitable books to buy (Spratt and Williams, 2011: 32). As mentioned above, students use skimming by glancing their eyes quickly to get main idea, for example, looking quickly at report's topic to find out important information.

- 3- **Schema Theory:** Schema is an active organization of past reactions and past experience. It is a sequence of knowledge which represents general approaches, social situation, percept event, or sequence of events. It assumes that people transform knowledge sequences into memory in order to use them for understanding and keep experiences (Reed, 2013: 222). Schema theory supplies the reader not only with ability to identify situation but also with prediction what will happen in the text (Kreowski, 2005: 161). Marrow,etal(2013: 23-24)point that "schema theory suggests that the more elaborated an individual`s schema and background knowledge, the more easily he or she will be able to learn new information about it". Individuals have schemas for content (eg. decoding, skimming, inferencing, summarizing) and different types of text (narrative texts, expository text) as children build multiple schemas, reading achievement will grow According to the schema theory readers use their own prior acquired knowledge. To contract meaning, schema theorists describe understanding as integration between readers' prior knowledge and written material (Zhu, 2005: 31).

9. Test Design & Experiment

The researcher taught the study group without bias to any group as in (Figure 1) which illustrates the design of the study. The length of the period of experiment is nearly the second semester of the academic year 2015 – 2016. The experiment started on the 3/3/2016 and ended on the 5/5/2016 of the same year.The study population includes Fifth Grade / High School Students at the Directorate of Education Anbar Province for the academic year 2015- 2016, where they are studying a course (English for Iraq).The study group was taught in accordance with Marzano’s model to keep learning while the comparison group was taught in the traditional manner. After the end of the allocated time duration of the experiment an achievement test was applied on the

two groups to see the impact of the independent variable on the dependent variable

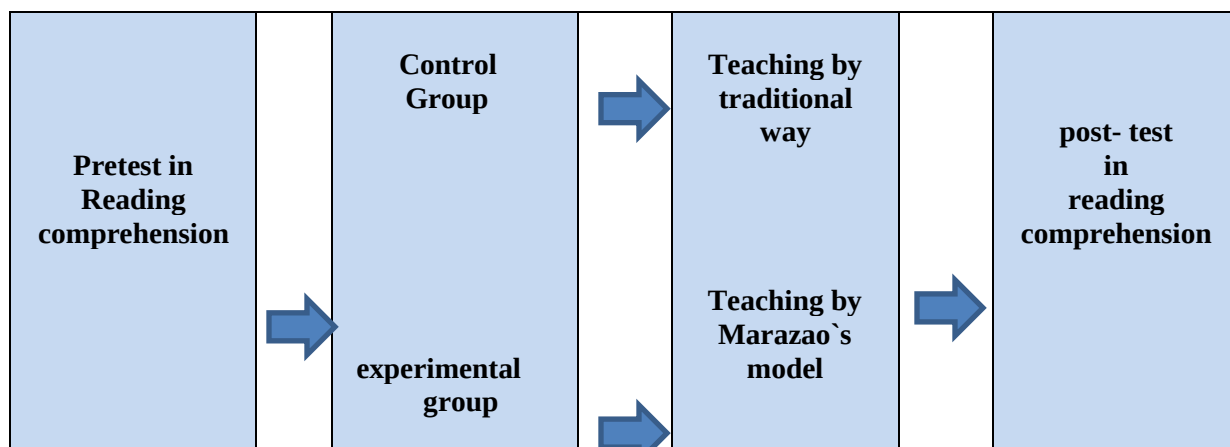


Figure (1) Study Design

10. Steps of the Experiment

1. Instructional Material

The instructional material includes the following the following reading texts from the Book *English for Iraq for Fifth Grade High School Students (Student`s Book and Activity Book) for (2015-2016)*:

- 1. Why We Should Recycle**
- 2. Fire Destroys Office Building**
- 3. The Oryx is Back**
- 4. The Spanish Captain**
- 5. Cars are Bad for Us**
- 6. Exploration of the Solar System**

2. Lesson Plans Preparation

The world witnesses progresses in all domains so depending only on previous experiences is not sufficient. Good planning is a necessary for successful teaching. Preparing lesson plans include the process of setting goals and choosing appropriate methods that help to achieve goals.

3. Validity

A- Test Validity

Furr and Bacharach (2014: 198) define the validity it is "the degree to which a test measures what is it supposed to measure". For example, instructional aptitude test will be valid if it was able to measure instructional aptitude and it is said that the test is valid when there are available evidence that the test is designed to measure what is attended to measures no other factors.

B- Referee Validity

The test was introduced to a jury of specialist in English language and methodology in Al- Anbar University, Ministry of Education and experienced supervisors and teachers in government schools.

C- Content Validity

Test content is the subject material, in which represents educational goals. Therefore, the test should include a large numbers of samples of the original content of the material subjects in which we want to measure.

D-Face validity

Face validity means that the "appearance of the test coincides with its use" (McDonald, 2002:28). It means the appearance of the test in terms of clarity and formulating vocabularies as well as the accuracy of the test instructions and the purpose the test.

4. Difficulty and Ease Coefficient

Difficulty coefficient refers to the percent of the failing student to the total students who answered the test. We can calculate this by using the following equation:

$$\text{difficulat coefficient} = \frac{\text{N. of failing students}}{\text{the total students who answer the test}} \times 100$$

Ease coefficient means the percent of the succeed student to the total students who answered the test. We can calculate this by using the following equation:

N	Difficulty coefficient	Ease coefficient	N	Difficulty coefficient	Ease coefficient
1	0.55	0.45	11	0.62	0.38
2	0.45	0.55	12	0.77	0.23
3	0.48	0.52	13	0.49	0.51
4	0.66	0.34	14	0.50	0.50
5	0.61	0.39	15	0.49	0.51
6	0.43	0.57	16	0.62	0.38
7	0.33	0.67	17	0.44	0.56
8	0.51	0.49	18	0.68	0.32
9	0.72	0.28	19	0.39	0.61
10	0.44	0.56	20	0.59	0.41

$$\text{Ease coefficient} = \frac{\text{N. of succeed students}}{\text{the total students who answer the test}} \times 100$$

Table (1) Difficulty and ease coefficient of each items of the test

Table (1) shows the difficulty coefficient would be between (0.33-0.77) with a total average (0.54) that means each items is acceptable or in the normal limit of difficult.

Whereas ease coefficient would be between (0.23- 0.67) with a total average (0.46) that means each items is acceptable or in the normal limit of ease.

5. Discrimination Coefficient

Item discrimination is "the degree to which an item differentiates correctly among test takers in the behavior that the test is designed to measure" (Kurpius and Stafford, 2006:115). It means the ability of the test's item to differentiate between the high achievers and the low achievers.

In order to account the item discrimination used equation as follows:

Discrimination coefficient

$$= \frac{\begin{array}{l} \text{N. of the students who} \\ \text{have the correct answer} \\ \text{from the high achievers} \end{array}}{\begin{array}{l} \text{N. of the high achievers} \\ \text{N. of the students who} \\ \text{have the correct answer} \\ \text{from the low achievers} \end{array}} - \frac{\text{N. of low achievers}}{\text{N. of low achievers}}$$

Table (2) discrimination coefficient of each item of the test

N	The power of discrimination	N	The power of discrimination
1	0.47	11	0.40
2	0.33	12	0.47
3	0.22	13	0.36
4	0.48	14	0.39
5	0.44	15	0.34
6	0.39	16	0.44
7	0.40	17	0.28
8	0.39	18	0.50
9	0.38	19	0.37
10	0.48	20	0.49

Table(2) shows the discrimination coefficient. It will be between (0.22-0.50), with a total average (0.40) which means that each items is acceptable or in the normal limit of discrimination.

6- Test Reliability

It is the degree to which the results of the test are similar if the test was applied twice within similar conditions. In other words the test is reliable when it gives the same results if it is repeated under similar circumstances. The researcher calculated the test reliability coefficient through: Split- half method: "In split- half reliability, a test is given and divided into halves that are scored separately. The results of one half of the test are then compared with that of the others" (Kaplan and

Saccuzzo, 2013: 111). According to the split-half method the result shows that the reliability coefficient is acceptable because they are (0.078) which means the test is valid and reliable to apply.

7-The Effectiveness of Wrong Alternatives

Multi-choice question includes several alternatives, one of them is a correct answer, while other alternatives represent possible answers, but they are wrong. If wrong alternatives are close to the correct answer, the alternative is strong. We can calculate this by using the following equation:

$$\text{effectiveness of wrong alternative} = \frac{\begin{array}{l} \text{N. of the students who} \\ \text{have the wrong answer} \\ \text{from the high achievers} \end{array} - \begin{array}{l} \text{N. of the students who} \\ \text{have the wrong answer} \\ \text{from the low achievers} \end{array}}{\text{total} / 2}$$

The result of statistical tool shows that the all alternatives have negative value that means they have attracted a number of students in the low group is bigger than high Group.

8-Statistical Tools

1- Chi – square: To equal for parents` achievement.

$$\text{Chi – square} = \frac{(O - E)^2}{E}$$

2- T- test

a- To equal between experimental group and control group.

b- To test Null hypothesis through comparing between students` scores.

$$t = \frac{x_1 - x_2}{\sqrt{\frac{S_1^2(n_1-1) + S_2^2(n_2-1)}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

c- Difficulty coefficient :

difficultat coefficient

$$= \frac{\text{N. of failing students}}{\text{the total students who answer the test}} \times 100$$

d- Ease coefficient:

Ease coefficient

$$= \frac{\text{N. of secceed students}}{\text{the total students who answer the test}} \times 100$$

e- Discrimination coefficient:

discrimination coefficient

$$= \frac{\begin{array}{l} \text{N. of the students who} \\ \text{have the correct answer} \\ \text{from the high achievers} \end{array}}{\begin{array}{l} \text{N. of the high achievers} \\ \text{N. of the students who} \\ \text{have the correct answer} \\ \text{from the low achievers} \end{array}} - \frac{\text{N. of low achievers}}{\text{N. of low achievers}}$$

f- Effectiveness of wrong alternative:

effectiveness of wrong alternative

$$= \frac{\begin{array}{l} \text{N. of the students who} \\ \text{have the wrong answer} \\ \text{from the high achievers} \end{array} - \begin{array}{l} \text{N. of the students who} \\ \text{have the wrong answer} \\ \text{from the low achievers} \end{array}}{\text{total} / 2}$$

Table (3) T-test independent sample of differences between control and experimental group for the post test

Group	N	Mean	Std. Deviation	T-test		Sig. level
Experimental	28	16.07	2.14	12.58	2.00	0.05
Control	28	10.00	4.37			

Table (4) shows that there are statistically significant differences between the experimental group and control group in the degree of each level, in favour of the experimental group. This means that the Marzano's model is effective.

Table (4) T-test results of differences between experimental and control groups for the literal level

Group	N	Mean	Std. Deviation	T-test		Sig. level
Experimental	28	6.04	0.70	7.20	2.00	0.05
Control	28	4.46	0.63			

Table (5) T-test results of differences between experimental and control groups for the inferential level

Group	N	Mean	Std. Deviation	T-test		Sig. level
Experimental	28	5.50	0.63	9.31	2.00	0.05
Control	28	3.14	1.16			

Table (6) T-test results of differences between experimental and control groups for the critical level

Group	N	Mean	Std. Deviation	T-test		Sig. level
Experimental	28	4.50	0.70	8.06	2.00	0.05
Control	28	2.43	1.14			

Table (7) "t" value eta square " η^2 " for each level and the total degree

Level	T. value	η^2	Effect volume
Literal	7.20	2.50	
Inferential	9.31	2.03	
Critical	8.06	1.81	
Total	12.58	1.38	

11. Findings & Discussion of Results

- 1- There are statistically significant differences at the level ($\alpha \leq 0.05$) achievement level between the scores of the experimental group to learn reading comprehension using Marzano's model and the scores of the control group who learned in the traditional way.
- 2- There are statistically significant differences at ($\alpha \leq 0.05$) in the literal level of reading comprehension between the scores of the experimental group and the scores of the control group.
- 3- There are statistically significant differences at ($\alpha \leq 0.05$) in the inferential level of reading comprehension between the scores of the experimental group and the scores of the control group.
- 4- There are statistically significant differences at ($\alpha \leq 0.05$) in the critical level of reading comprehension between the scores of the experimental group and the scores of the control group.

12. Conclusions

The results showed that the level of the experimental group is better than the level of control group. The researcher attributes this result to the following reasons:

1. Marzano's model of learning tends to be more fun for students than the traditional way, which is dominated by the teacher.
2. Marzano's model enhances the teacher to be supervisor and guide; subsequently students feel they are an important source of information and facts, by applying what they have learned in new situations. In this regard, the student's role will be positive towards the process of learning.
3. Marzano's model of learning is a modern teaching model that makes the students the center of the educational

process, through research, investigation and experimentation.

4. Learning happens on the basis of on the learner's positive attitudes and about learning, and the use of productive habits of mind.

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