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ABSTRACT

The aim of this research is to identify the effectiveness of an educational design according to the theory of teaching diversification in correcting misconceptions among students of the second intermediate grade, and for the purpose of achieving the goal of the research, the null hypothesis has been formulated which states that (there is no statistically significant difference at the level of significance (0.05) between the average scores of students of the experimental group who will study according to the instructional design to diversify teaching, and the average scores of the control group who will study according to the usual method of testing Correcting misconceptions.

The researcher has been relying on the experimental design with partial control, and an analysis of the science book Part I for the first and second intermediate stages was carried out before the start of the experiment and the extraction of common concepts (repeater) between the concepts of the second grade intermediate (research sample) and the concepts of the first intermediate, as their number reached (32) duplicate concepts, and these are the concepts adopted by the researcher in the construction of the test of diagnosis of erroneous concepts, the researcher has conducted equivalence in the following variables, the chronological age calculated In months, IQ test, test of previous information, diagnostic test of concepts), and after drawing the results of the diagnostic test it was found that there are (14) misconceptions,

As for the second stage, which represents the correction of misconceptions, the experiment was carried out through the study of the two research groups all the vocabulary of the first four chapters of the science book Part I and after the completion of the experiment, the two research groups tested the post-test built by the researcher from (42) paragraphs, and at three levels (definition, distinction, application) of the type of multiple choice of four alternatives, and when correcting the students' answers the researcher obtained the data for the experimental group and the control group, and using the means The results showed the superiority of the students of the experimental group who studied the educational design according to the diversity of teaching over the control group who studied according to the usual method in the variable of correcting misconceptions and in the light of all of the above, the researcher has reached a number of conclusions, recommendations and proposals.

Keywords :Instructional Design, Theory of Teaching Diversification, Correction of Misconceptions, Second Grade Intermediate Students

INTRODUCTION

The great developments witnessed by the world in various scientific and technological fields have imposed themselves on the educational process, and there are many emerging problems as a result of the emergence of many information that students should deal with and absorb easily by using information technology in education to achieve the goals of education, ⁽¹⁾ and education is an organized process practiced by the teacher with the aim of transmitting the information and knowledge in his mind and communicating it to students who need that knowledge directly within the framework of An organized process through which a change in the relatively constant behavior resulting from training is attempted, because the information given to the student would change their behavior or modify it for the better ⁽²⁾

Thus, the study of the curricula of natural sciences has become one of the important things in human life, and the emphasis has been placed on the study of chemistry; being one of the basic and necessary curricula that require attention in its various branches; and because it participates effectively in the development and progress

like the rest of the other natural sciences with its diverse and precise branches that are widely involved in the daily life of the student⁽³⁾, the science subject also contributes to the development of the student's cognitive and mental abilities, upgrading the student's personality to face the problems of daily life, and highlighting the theoretical aspects and applied which is reflected in the construction of the curriculum⁽⁴⁾.

Therefore, instructional design represents a set of procedures that are represented in the selection of the study material to be designed, then analyzed, organized, developed and evaluated in a way that helps the learner to learn in an easier and better way and with the least effort and time by following the educational methods that suit the learning patterns of students, and the design is based on the philosophy that makes the learner the center of the learning process when planning the lesson⁽⁵⁾ Diversity in teaching methods and methods is a decisive and important factor in encouraging students to participate in the Learning When the teacher recognizes the preferred patterns by which they learn and dealing with them with these patterns will avoid the negative effects of dealing with students with educational methods that do not take into account the importance of individual differences between students and their characteristics and levels of knowledge and psychology⁶

Based on the above, the mental image that students form of the same concept varies with the experiences they are going through, it is possible that the meaning of the concept is similar in students who differ in their understanding of the concept when the experiences they are going through are similar and this does not mean that all students reach the same level of understanding, which reflects this disparity in students' understanding of concepts resistant to change and coherent; because they were formed according to their personal experience it is difficult for students to abandon them and therefore need attention to change them⁽⁷⁾.

Theoretical background and previous studies:

Instructional Design Concept:

Instructional design represents a set of events and procedures to organize and plan the educational situation within a specific time limit, it represents the studied and measurable steps and is implemented individually or collectively with educational situations that may be short-term or long-term characterized by comprehensiveness to achieve the desired results, and is also the means of reducing time, effort and cost in the education process in order to reach the best desired results⁽⁸⁾.

The relationship of instructional design to the teaching and learning processes:

The teaching and learning processes are two inseparable parts, and combine them into one situation in the educational curriculum called the educational situation in which knowledge and skills are transferred and acquired using certain techniques guaranteed by the situation in achieving specific goals, and learning may occur without the process of education and be within the initiative of subjectivity and individuality by interacting with the target material in meeting his needs or solving the problems he faces, which confirms that the teaching and learning processes can occur separately⁽⁹⁾.

Diversification of teaching:

The diversification of teaching is a contemporary vision based on the principle of providing a suitable learning environment for all students, including students with slow learning, and this also includes ordinary and distinguished students by integrating them into one classroom provided that educational situations are created that meet the needs of each of the three categories of students, the diversification of teaching is based on many studies, including the study of Kardner in multiple intelligences, in which he identified a set of intelligences in which all individuals are distinguished. But to varying degrees, this theory is consistent with the concept of diversifying teaching in helping teachers expand their teaching strategies to reach the largest number of students of all intelligences, which enhances their active intelligences and develops their inert intelligences.⁽¹⁰⁾

The foundations on which the principle of diversification of teaching is based:

- ❖ Every pupil is able to learn, and is teachable.
- ❖ Pupils learn in different ways.
- ❖ The human brain seeks access to understand the information it receives.
- ❖ Learning occurs best in situations of appropriate and reasonable challenge.
- ❖ Man always seeks success and excellence.
- ❖ Accept differences between an individual and others
- ❖ The teacher is a facilitator and coordinator of the learning process.
- ❖ The learner is the most important axis of the educational process, and learning is the main goal of teaching.
- ❖ Teaching aims to help the learner to understand and form the meaning, that is, to turn information into knowledge that he can use in multiple situations.
- ❖ Comprehensive and continuous assessment is a means of discovering the needs of pupils, identifying the tendencies and abilities of each of them and their learning patterns and identifying differences between them to guide teaching to harmonize these differences.⁽¹¹⁾

Misconceptions:

One of the most widespread terms is the term misconceptions after its approval and adoption at the International Symposium of Science and Mathematics, and the term wrong concept has been used to describe and explain the unacceptable and incomprehensible by the learner after going through a certain learning activity, they are tribal to the learner and these concepts may be the result of improper observations or illogical thinking ⁽¹²⁾.

Principles of concept correction:

- ❖ Attract existing alternative perceptions in students.
- ❖ Use of experiences and activities that contradict their alternative perceptions.
- ❖ Encourage students to resolve discrepancies during discussion within the classroom.
- ❖ Provide students with the opportunity to reuse scientific ideas in a new way in new contexts. ⁽¹³⁾

Previous studies

Enas Ali Jawi Badrawi (2020) Iraq

The Effect of Teaching in the Needham Model on Contemplative Thinking and Modification of Historical Concepts Erroneous in Fifth Grade Literary Students

This study aims to identify the impact of teaching in the Needham model in modifying erroneous historical concepts and reflective thinking in students of the fifth grade of literature, the researcher in this study has used two tools to study the test of modifying misconceptions and the test of Tamil thinking for the two equal groups (experimental and controlled), and the number of students of the sample (60) female students for the fourth grade literary in the preparatory of Al-Khwarizmi for girls, affiliated to the Directorate of Education of Wasit, where the number of students of the experimental group (30) students who studied According to Needham's model, the other group is the control group and the number of its students (30) students who studied according to the usual method, and the researcher processed the data statistically using (t.test) for the two independent samples, and the results showed the superiority of the experimental group over the control group, and in light of the results of the researcher developing conclusions, recommendations and proposals to conduct other studies on the Needham model in other phase variables ⁽¹⁴⁾

Research Methodology and Procedures

First: Determining the educational content:

The science book was identified the first part of the second grade intermediate for the academic year as an area of educational design, and the researcher adhered to the vocabulary prescribed in the content of the educational material for the first semester of the year (2022-2023), the fourth edition of 2021, which was represented by the two units:

- ❖ The first module includes the two chapters (I: Elements and Chemical Interdependence, and Chapter II: Chemical Compounds)
- ❖ The second unit includes the two chapters (Chapter III: Formulas and Chemical Reactions, and the Fourth: Solutions) and the vocabulary contained therein.

Second: Defining Chemical Concepts from the Science Book Part I for the Second Intermediate Grade:

The researcher has relied on the method of content analysis because this approach is the scientific method in which chemical concepts are defined, adopting the concept as a unit of analysis because it fits the objectives of the research, provided that the chemical concept is calculated once even if repeated more than once. The researcher identified the chemical concepts contained in the course covered by the experiment through the following steps:

- Read the topics of the book in general so that an idea of the content and main ideas is formed
- Re-read topics accurately to identify vocabulary that denotes chemical concepts
- Classification of concepts in a special table contained in the four chapters In the light of the definition of the concept, (55) concepts were identified, and the analysis was re-analyzed by another teacher for the same stage to find out the validity of the analysis and it turns out that the percentage of conformity is 98%, as shown in the table (1).

Table 1: Concepts in the four chapters

Number of concepts mentioned	Topic	Chapter	T
20	Elements and Chemical Bonding	One	1
13	chemical compounds	Second	2
10	Chemical formulas and reactions	Third	3
12	solutions	Forth	4
55	Total		

In order to ensure the correctness of the analysis of chemical concepts, the concepts identified were presented to a group of experts and arbitrators in the curricula and teaching methods of science appendix (), relying on the percentage of agreement (80%) and more as a criterion for accepting the concept, and (5) concepts were excluded namely (degree of support, boiling point, electrical conductor, charge, combustion), and the agreement obtained (50) concepts.

Third: Identification of the chemical concepts repeated in the previous school stages:

The purpose of the repetitive concepts that students have already studied at previous stages (Intermediate first stage) which will be studied in intermediate second grade cumulative concepts ", considering that the cumulative concepts are passed on to subsequent grades, The first part of the first middle grade was analyzed. and the researcher adopted the same steps as in the analysis of the science book Part I of the second middle grade in the previous step, The concepts common to the intermediate phase II were taken into account in its definition of concepts in this step. (Research sample) and the first stage of intermediate and the exclusion of new concepts not previously studied for middle second graders in previous school stages. (32) understandably, which received more than (80%) of the expert and specialist agreement, according to J Cooper's equation G.Cooper) These are the concepts adopted by the researcher in building the diagnostic test for the wrong concepts.

Fourth: Research and Sample Society

The current research community is the middle second graders in schools (Intermediate and Secondary) Daytime Government of the General Directorate of Education of Babylon Governorate - Misib District for the academic year (2022-2023), which includes at least two divisions for the second middle grade. The research sample was selected at random and included one of the schools of the Masib district. The sample consisted of 33 students in the pilot group and 31 students in the control group.

Fifth: Research Tool:

Diagnostic test for erroneous concepts:

The researcher seeks through the test to measure the level of students' acquisition of specific chemical concepts included in the subject of the experiment of the first part of the science book of the middle second grade that students have learned before, by answering about the diagnostic test paragraphs of common chemical concepts.

Test Construction

The researcher used the concepts previously studied by the student at a previous school stage: (The first average) which he will later study in the second middle grade ", because the researcher believes that concepts are cumulative and their effect moves to subsequent grades, The researcher analyzed the content of the science book Part I for the first and second middle grades and the researcher adopted the same steps as in defining chemical concepts in the previous step, In defining the concepts for this step, the researcher took into account the chemical concepts common to the second grade intermediate concepts. (Research sample) and middle first grade concepts, excluding new concepts not previously studied in previous school stages, and the number of concepts repeated in the science book for intermediate first phase (32) Understandably, the researcher built a diagnostic test based on pre-defined chemical concepts with the aim of diagnosing misconceptions among middle second graders and transforming each concept into a multi-choice test paragraph.

Formulation of test instructions:

The researcher formulated the instructions for the diagnostic test, which includes the following: (student information and includes name, division, grade, and the time of answer to the test making sure not to leave any paragraph free of an answer or choose more than one answer on one paragraph, which leads to neglect it when correcting and asked them to read the test paragraphs carefully and accurately and put a signal about the letter for the correct alternative.

Truthfulness of the test:

The honest test is the one that measures what was designed for it, and the researcher relied on (apparent honesty, as the percentage of agreement on the honesty of the virtual (80%) of the arbitrators and specialists,

Application of two-stage diagnostic test:

Phase 1:

The first exploratory experience to clarify the instructions and paragraphs of the test, as well as the time taken by each student to answer the test paragraphs, was also determined. Furthermore, the test was applied to the first exploratory sample, which is not the research sample made up of (40) Students of the middle second grade, after the completion of the answers, the average time of each student's completion of the answer on the paragraphs of the diagnostic test was calculated, and the average time was calculated (40) minutes

Phase II:

The test was applied to a sample other than the test sample consisting of (200) students in the middle second grade for the purpose of analysing the diagnostic test paragraphs and ascertaining the psychometric properties, represented by Palatine.

The difficulty factor for the test paragraphs:

the proportion of students who answered alternatives incorrectly to the total number of responses, as the difficulty factor was calculated from an equation of the substantive paragraphs, and the level of difficulty was found to be between 0.40 and 0.80. The test is good and suitable for students in terms of difficulty.

A differentiation factor for test paragraphs:

the ability of the test to distinguish between higher students' grades and lower students' grades in the adjective measured by the paragraph. The test paragraphs have been shown to have a discriminatory strength of 0.27-0.80.

The effectiveness of erroneous alternatives: Calculating the effectiveness of alternatives for students' responses to higher and lower-level research groups, shows that erroneous alternatives to diagnostic test paragraphs have attracted a greater number of lower group students than higher group students, that is, the factor of effectiveness of alternatives is negative, so it is decided to retain all alternatives without deleting or modifying them.

Sixth: Test stability:

The stability of the test depends on the relationship between the test paragraphs, the stability represents the statistical indicator on the accuracy of the measurement, and the stabilization factor is calculated in the first two halfway segmentation, so the stability factor is Pearson. (0.89) and corrected by Spearman Brown at (0.94), and the second method using an equation (Keoderichadson-20) because it serves as the internal consistency measure of the test, reaching the correlation coefficient (0.95) This indicates that the test has a high degree of stability.

Seventh: Application of the search tool:

The researcher applied the diagnostic test to the two research groups on Sunday (16 /10/ 2022) and asked the researcher to read the instructions accurately and answer questions and the grades were obtained and processed

Eighth: Experimental design:

The research includes one independent variable: the design of education according to the diversification of teaching and a subordinate variable (correction of erroneous concepts).

Ninth: Parity of the two research groups:

Before starting the experiment, the researcher ensured parity between the two research groups (experimental and control) in some variables that he thought might affect the results of the experiment, and parity was given in the following variables (age time calculated by months, test of previous information, test of intelligence, diagnostic test of erroneous concepts,) as shown in table (2) below:

Table 2.

Indication level on (0,05)	T value		Freedom Degree	Contrast	SMA	N.O	Group	Variable
	Tabular	Calculated						
Non statistically significant	2,00	0,881	62	45,29	154,31	33	Experimental	Chronological age in months
				27,98	152,19	31	Control	
		0,721		9,952	13,12	33	Control	Previous information test
		0,858		9,902	11,56	31	Control	
		0,779		36	29,05	33	Experimental	IQ test
				42,02	27,77	31	Control	
				8,84	12,83	33	Experimental	diagnostic test
				9,24	11,29	31	Control	

Control of extraneous variables:

The researcher tried to adjust the extraneous factors to ensure the integrity of the trial procedures which can affect research procedures and hence its results, To attribute the effectiveness of the independent variable to the dependent variable rather than to other variables. These variables include and how to adjust the first variable. ", the researcher tried to control the differences in sample selection through random withdrawal, Parity for students of the second variable research groups maturity factor and maturity did not affect the current research because the duration of the experiment was one between two groups, The third experimental extinction variant, during

the duration of the experiment, occurred only in routine absences involving the two research groups, The fourth variable is the measurement instrument, which had no effect, because the researcher used the same measurement instrument, which is to test the concepts mistaken for the two research groups,

Preparing Search Requirements:

For the purpose of applying the experiment, the researcher prepared some requirements, including scientific material, so the scientific material that the researcher teaches to the two groups was determined during the duration of the experiment. (First semester) of the academic year (2022-2023) The first four chapters of the science book included the first part of the second grade medium, and the actual teaching of the experience was started on Tuesday corresponding (18/10/2022) teaching ended on Thursday (29/12/2022).

Research tool (testing therapeutic concepts)

The 42-paragraph test was built across three levels (Definition, distinction, application) Each paragraph contains four alternatives, the test was presented to a group of experts and the acceptance ratio was (80%) and conducting a test test on two survey samples, the first sample to clarify paragraphs, instructions and the second sample for statistical analysis and after correcting students' answers, the factor of difficulty, excellence and effectiveness of alternatives was calculated.

Statistical means:

The researcher used statistical methods, including the t.test test of the two independent samples to perform parity between the experimental group and the control group, the Kai square, the Pearson binding coefficient, the Spearman correlation factor and the formula according to the potency.

Results:

The results showed that the students of the experimental group who studied educational design were outperformed by the diversification of teaching to the students of the control group who studied in accordance with the usual method of testing correcting the concepts wrong after, and table (3) shows this.

Table 3. Results of two research groups in the test of correction of erroneous concepts in science

Indication level on 0,05	T value		Degree of freedom	Contrast	SMA	N.O Students	Group
	Tabular	Calculated					
Significant	2,00	3,162	62	38,78	28,24	33	Experimental

CONCLUSIONS

- ❖ Effectiveness has a significant positive role to play in adopting experimental design according to the diversification of teaching in correcting the erroneous concepts of middle second grade students compared to the usual teaching method.
- ❖ The use of teaching diversification strategies depends on students' activity and learning according to their preferred style of thinking, engagement, dialogue with colleagues and exchange of ideas, which has led to correction of what exists from a misperception in their previous structure.

Proposals:

- ❖ Conduct similar studies for current research in diagnosis and processing of erroneous concepts of different study materials and other educational stages.
- ❖ Conduct a comparative study of an educational design according to the diversification of teaching with other theories that include strategies to determine its effectiveness in correcting erroneous concepts and compare their results with the results of the current research, and indicate which ones are more useful in serving the educational process.

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