An ASSURE-Model Instructional Design Based on Active Learning Strategies and its Effect for 1st Intermediate Student's Higher Order Thinking Skills in Teaching Science Text Book

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ABSTRACT

The Present paper aims at designing an ASSURE-Model Instructional Design Based on Active Learning Strategies and Its Effect for 1st Intermediate Student's Higher Order Thinking Skills in Teaching Science text books. The proposal design consists of six stages (A-S-S-U-R-E). A Higher Order Thinking Test has also been constructed while consists of (40) Multiple Chooses Question items, all steps of tests construction have been adhered to in building this test. Whose effectiveness has been proved by the find results of this paper.

Keywords: Instructional Design, ASSURE Model, Higher Order Thinking Skills, Active Learning.

The Study Problem

The world witnesses a huge expansion of sciences and generation of ideas that are directed towards facing everyday life situations, and education is the cornerstone. Most of the developed countries pay great attention to prepare human properly in a way that copes with the rapid development of the world (Valle et al., 2018). This can be achieved through sound content and methods of teaching to ensure the interaction between the teachers and the learners and the learnt sciences. But the traditional schools in Iraq still depend on the scientific material and focus on instructing the learners or make learners memorize the information during the exam. Based on the researcher's experience in the college of education and his direct contact with biology and Chemistry teachers, he finds that most of the teachers do not pay attention to learning process design. The process, for them, is a kind of random and unorganized process, which motivates the researcher to employ an ASSURE-model and adopt some strategies of active teaching. So, the study problem can be found through the following question:

What is the effect of an ASSURE-Model Instructional Design Based on Active Learning Strategies to Teaching Science text book on Higher Order Thinking Skills for the 1st Students Intermediate School?

The Importance of the Study

The science of instruction design is one of the sciences that is interested in describing the procedures of selecting scientific materials including (tools, equipment, materials, programmers and curriculum) then analyze, organize, develop and evaluate them (Reigeluth, 2013a). The aim is to reach to a design of curriculum that helps learners in a better way, and helps teachers to follow the best teaching method that saves time and efforts (Wiley, 2000). The educational designer is a teacher approaches from the educational planning by the goal, and he has a specialized knowledge in teaching field and able to utilize from systemic processes to identify the educational challenges (Hod, 2017). The educational designer deals with these challenges through skillful application of wide experience with educational tools. The educational designer knows how the students learn and he has a deep understanding of the content (Seels & Richey, 2012).

The importance of educational design

The educational design has several advantages that can be summarized by the following:

- Improving the educational practices by using educational theories.
- Saving time and efforts
- Employing educational tools and equipment properly.
- The teacher depends on his/ her own efforts in teaching process.
- The learner's interaction with the scientific material.
- Finding the relationship between the theoretical and application principles in educational situations.
- Clarifying the teacher's role to facilitate learning process.
- The sound evaluation of students’ learning and learner’s reaction.

(Gagne, Wager, Golas, Keller, & Russell, 2005).

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Through searching in the previous studies that tackled local or international educational designs, there are different educational designs of various strategies like (Al-sudani, 2017; Author, 2012) that adopted the ADDIE model. Also, there are studies adopted systems approach of design including Yusra 2018, but building up a design based on an ASSURE-model is the first study, as far as the researcher knows, in the field of methods of teaching sciences (Al-shamy, 2012).

**The two study goals**
The study aims to:
- Build an instructional design based on an ASSURE model according to active learning strategies for the 1st intermediate stage in teaching biology and Chemistry.
- Identify the effect of the proposed instructional design based on an ASSURE model according to active learning strategies for the 1st intermediate stage in teaching Science text book.

**The study hypothesis**
- There are no differences of statistical significance at (0.05) level among the means of the student’s marks of the experimental group who studied 1st intermediate stage Science text book according to the proposed instructional design of higher thinking skills and between the means of the control group who studied 1st intermediate stage Science text book according to the regular method.

**The study limits**
The study is limited to:
- First year students of intermediate stage of the morning schools that belong to the general directorate of education in Al-Diwaniyah governorate.
- The first and the second parts of sciences textbook of the 1st year intermediate stage, second edition that includes (chemistry and biology) (Mohammadmad; et al., 2017).
- The first semester of the academic year 2017-2018.

**Definition of Terms**

**Instructional design**
It is defined by Reigeluth 2013 as the systemic entry that can be achieved through planning and producing efficient instructional materials. It means planning, developing and evaluating the entire educational process efficiently. It is a group of serial steps and formal and organized procedures, which through scientific material is implemented in any field of human learning as the process includes sources, situations, programmers, lessons and the prescribed content of learning (Reigeluth, 2013a, 2013b).

**ASSURE model**
It is an instructional design aims to produce more efficient instruction and learning and letters of "ASSURE" is an abbreviation refers to the six steps in the model:
- (A) Analyze learners.
- (S) State standards and objectives.
- (S) Select strategies, technology, media and materials.
- (U) Utilize technology, media and materials.
- (R) Require learner participations.
- (E) Evaluate and revise.
- (Baran, 2010; Model, 2018).

**Active learning**
It is one of the patterns of learning based on different activities performed by the teachers that resulted in several behaviors, which depended on the student’s positive and active engagement in the learning process. Active learning requires students’ participation to select learning rules, systems, and diverse sources and identify goals. The students are allowed to communicate with teachers where several teaching strategies are used that focus on learners as to correspond with his/ her learning pattern, abilities and intelligence degree (Ueckert & Gess-Newsome, 2008).

**Higher order thinking skills**
It is defined as cognitive activities that exceed lower levels of remembering, understanding and applying, which are called lower thinking skills to reach the levels of analyzing, synthesizing and evaluating that are called Bloom’s higher thinking skills (VandenBos, 2007; Wang & Wang, 2011). Also, Douce 2012 has defined it as the skills that the students can acquire knowledge due to their mental activity rather than memorizing information then apply the information in new situations to solve problems to achieve expected results (Douce, 2016).

The researcher has defined it procedurally as the abilities of 1st year intermediate stage students, the study sample, to (observe, describe, organize, critically inquire, solve open- ended problems, analyze and model data, establish expectations, analyze, synthesize, application and evaluation), which represent higher thinking skills measured by the marks gained by students through answering the test of higher thinking skills that is prepared by the researcher for this purpose.
Literature Review

**Instructional design**

It is the practice of creating instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing. The mechanism of designing includes identifying the current situation of the student and his/her needs then identify the intended goals of the learning process (Shapiro & Wardrip, 2019). Also, plan and design the steps that should be followed to reach the envisaged outcomes (Merrill & Twitchell, 1994). What control the design steps is the concept taken from pedagogy, which is efficient and can be applied in case study of students only, study by teacher or in the cases of community education. The design results might be known and measurable or it can be hidden and hypothetical (Gagne et al., 2005).

There are several models of instructional design, each depends on five-phases ADDAI Model (Analysis, Design, Development, Implementation, and Evaluation) and ASSURE model is one of these models (Kruse, 2002; Molenda, 2003).

ASSURE model is considered one of constructional systems design (ISD) used to by teachers trainers in the classes to design and develop instructional environment and make it more efficient (Andrews & Goodson, 1980).

ASSURE model includes six phases each one represents a letter of the term. The Fig1 shows the six phases:

**Active learning**

The world witnesses a great development in all fields of knowledge including education in general and methods of teaching in particular. The trends of teaching need to develop new types of students learning that make them engaged, active, and interactive in the classroom, participating in the experimental programmers or solving scientific problem. These practices allow them to abandon traditional method, which prevents them from activating their self-motivation, developing intellectual curiosity for each one of them (Bonwell & Eison, 1991). This leads to the emergence of several views in this field that criticize traditional methods and search for new ones especially these work on paving the way for learners to assume their active and positive role as to correspond to their scientific level (McCarthy & Anderson, 2000).

Based on these facts, the educationists direct their interest towards developing methods and styles of teaching that engage the students in learning situations. Active learning focuses on the learner that makes learners the hub of learning process (Prince, 2004). In this type of learning, there are several teaching methods and strategies correspond to the learning content and situation and consider the ages of the students. Moreover, it works on developing learners’ thinking through raising questions about the natural world they live in and it relation to other around him/her (Hohmann, Weikart, & Epstein, 1995). So, active learning is a method of learning and educating at the same time where students participate in different activities that allow them to positively listen, attentive thinking and sound analysis for his/her scientific materials. The learners share their views in the presence of the facilitator teacher, which motivate them to achieve learning goals (Johnson, Johnson, & Smith, 1998).

![Fig1 Eps. An ASSURE six phases](image)

**Higher order thinking skills**

Higher order thinking skills are one of thinking types of high content, which targeted students with complicated and unfamiliar problems, issues or events that require compound solutions and resulted in taking decisions related to high mental performances (Miri, David, & Uri, 2007).

Higher order thinking skills include several characteristics of creative and critical thinking. These skills are learnable and teachable by the students, all students have the ability to learn and apply them in new situations and sciences (Heong et al., 2011). Developing and improving higher order thinking skills is one of the main goals to reform teaching sciences in the world (Zohar & Dori, 2003). They help to employ and predict future needs to establish sound educational system. So, the need for adopting such skills is very urgent to reform the educational system (Hugerat & Kortam, 2014).
**Addressing the research Gap**

The current study attempts to fill the gap between theorizing for ASSURE model and applying it to teach one of the subjects of intermediate stage (1st year) in Science textbook and verify its effect on achievement and high order thinking skills. According to the researcher’s knowledge, the current study represents a new vision in the science of instructional design and it will be a practical application for the model.

**The Procedures of the Study**

**The phases of building up proposed instructional design based on ASSURE model**

To build up an ASSURE-model instructional design based on Active learning need to depend on systemic, organized and planned approach that progresses according to measurable and verifiable steps. ASSURE model consists of six phases, which the researcher depends on to establish his instructional design as shown in Fig2.

![Fig2 Eps. Phases of an ASSURE-model instructional design (designed by the researcher).](image-url)
The researcher will tackle the phases of the design in details

(A) Analyze learners:
The designer identifies the students’ characteristics in a way called internal behavior. There should be a kind of focus on the learners' characteristics that are related to the required outcomes of learning. The gathered information will help the designer to take right decisions related to the next steps of the process since they guide the designer to select the definite strategies and resources for the learning process (KAFI, 2017). This can be done through answering the following question: what are the known factors about students, as a group or individuals that affect the plans of their learning? The trend here is to use course pattern in which the students can follow up efficiently and seriously their learning according to their progress and their own programmers. In some cases, the students can select their learning experiences, experiments and study materials (Summerville & Reid-Griffin, 2008).

Analyzing learners should include the following:
- General features of learners like age, academic abilities, social type (sex) and interests....etc.
- Previous expertise
- Learning styles like touch, audio, visual ones.

The targeted group of the instructional design is identified as the students of 1\textsuperscript{st} intermediate stage of morning study schools in Al-Qadisiyah governorate for the academic year 2017-2018. The study sample is selected from Al-Azhar Al-Sharif intermediate school for boys due to cooperation of Biology and Chemistry teachers to implement proposed instructional design after being trained for a week by the researcher.

The school contains three classrooms for the 1\textsuperscript{st} intermediate stage (A, B and C). Two sections are selected randomly to represent the two groups; the experimental group (33) students and the control one (32) ones. The two groups are qualified statistically depending on independent samples- test of age, previous study achievement and intelligence variables. So, the two groups are equivalent.

(B) State and behavioral goals:
It is the second step in which the teacher has to identify the standards and goals for the learning unit he/ she intends to teach. This step defines the specifications of what the learner can do in respect to instructions, and here the designer identifies the state goals that should be given to learners. Also, he/ she analyzes the content of the study materials based on the behavioral goals, which the students should master them (Model, 2018) through the following question: What do we intend to achieve from learning each subject? (Organizational Structure). All educational programmers are built on wide range of goals that are defined by society like good citizenship, professional efficiency and these are related to philosophical and moral considerations inspired by group desires (Al-Khattat, Al-Muhja, & Mohammed, 2019; Kemp, 1971).

The researcher has analyzed Science text book of the 1\textsuperscript{st} intermediate stage of the 1\textsuperscript{st} semester, which includes three units; the first unit: (biology, chemistry and technology) includes two chapters: microscopes, the second chapter: scientists contribute to develop biology and Chemistry. The second unit (body of living organism); it includes three chapters: 1\textsuperscript{st} chapter“ cell, 2\textsuperscript{nd} chapter: cell division and 3\textsuperscript{rd} chapter: organizing the work of the body of living organisms. The third unit (genetics and development). It includes two chapters; 1\textsuperscript{st} chapter: the concept of genetics and the 2\textsuperscript{nd} one is applications of genetics.

<table>
<thead>
<tr>
<th>Table 1: Content analysis based on Bloom’s taxonomy of cognitive domain in its six levels of the six chapters of Science text book (part one and two).</th>
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<tbody>
<tr>
<td><strong>Unit</strong></td>
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<tr>
<td>1: biology and technology</td>
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<td>1</td>
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<td>1</td>
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<td>2: body of living organism</td>
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<td>2</td>
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<td>3: genetics and development</td>
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<td>3</td>
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<td>Total</td>
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</tbody>
</table>

(S) Identify strategies, technology, multimedia and materials:
The second letter (S) here refers to strategies, technology, multimedia and selected materials. In respect to your educational goals, it is necessary to select educational and technical strategies and media that will achieve the results you want.

First, you have to define the best mechanism to deliver your instructions. For example, what is the percentage of instructions that will tackle methods of teaching? What is the percentage that will tackle students? Active learning strategies have been identified (Smaldino, Lowther, Russell, & Mims, 2008).

The most important strategies are those focus on the learner himself. Learning becomes more stimulating when there is more participation in the class. Eventually, the student not the teacher has to master the material (Silberman, 1996). Despite this situation, the teacher has to introduce and prove some technical and important information. Education in its best situations is when the teacher guides and steers students to discover the correct answer for the same problem. The active teacher is the facilitator of the learning process (McCarthy & Anderson, 2000).

Six strategies of active learning have been selected including (fish bowl, one minute sheet, checkout card, cause and result map, five fingers and number heads together) (Berland & Berland, 1982; Mutalik, 2016). The use of these strategies is based on the need, it is possible to use more than one strategy in one educational situation (Holzer & Andruet, 2000).
Upon identifying the six strategies mentioned above, the researcher wrote (20) teaching plans for the experimental group taking into consideration the rules of writing model lesson plans (Shuo, 2010). Also, he employed more than one strategy in a plan. Also, he wrote (20) lesson plans for the control group. He teaches the two groups to ensure the equivalence of the two groups.

**The study tool**

Testing higher order thinking skills:
During this stage, the researcher has built up a test of (30) items of multiple choices questions (MCQ) of higher order thinking skills after studying previous tests in this field (Haladyna, 1997; Hopson, Simms, & Knezek, 2001). The researcher has adopted the steps of establishing scales and test as the following:

**Face validity**
The researcher has presented his test in its initial version to several arbitrators and used Chi square to judge the test items through comparing the calculated value with the tabular one (3.84). He amends some items depending on the arbitrators views as shown in appendix 1 (Mohammed, Al-Khattat, & Al-Muhja, 2019; Willner, 1997).

**Statistical Analysis of the items of higher order thinking skills**
The researcher conducted the exploratory application of the study sample about (250) students to verify the following:

**Items discrimination**
The researcher correct the test sheets and %27 of the heist marks and %27 of the lowest marks (Extreme Groups Method) Since the number of the sample of statistical analysis for the items of the test items of (250) students, the number of students in two groups should be (68) students then he applies items discrimination coefficient and all items are discriminated. The items marks are between (0.59-0.20). The item that has discrimination coefficient between (0.80-0.20) is considered a discriminated item (Reynolds, Livingston, Willson, & Willson, 2010). Table (2) shows the situation.

<table>
<thead>
<tr>
<th>No.</th>
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<th>No.</th>
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**Item difficulty**
The easy coefficient means the percentage of those answer the item correctly. The tests are considered good if test items are different in their difficulty between (0.80-0.20). Whenever the difficulty degree is high, it means the item is easy and vice versa (Mohammed, 2017; Reynolds et al., 2010). The degree is about (0.53-0.21) and table (3) clarifies this.
Table 3: Item Difficulty for testing higher order thinking skills.

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<th>No.</th>
<th>Item Difficulty</th>
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The correlate of the item mark to the total mark in the test of higher order thinking skills

The correlation coefficient of each mark of the item is calculated in relation to the total mark of the test of higher order thinking skills. Since the mark of each item is (0 or 1); they are in form of points (intermittent) while the total mark will be on the continuous scale, the researcher uses the point-biserial correlation and each calculated value of the correlation coefficient related to the critical tabular value at the significance level (0.05) and freedom degree (0.113). The relation of all items are statistically significant (Varma, 2006). Table (4) explains this.

Table 4: The correlate of the item mark to the total mark in the test of higher order thinking skills.

<table>
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<tr>
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</table>
Efficiency of wrong alternatives

The efficiency of wrong alternatives is calculated and it shows that the results of this equation is negative for all wrong alternatives of the test items. The values are between (-0.50 to -0.36). It means that wrong alternatives attracted more number of students from the lower group than higher one.

Reliability

It means the high degree of accuracy and consistency of the data provided by the tastes behavior (Rosen, Mohs, & Davis, 1984). The results of reliable test can be adopted by using Chronbach’s Alpha (Gliem & Gliem, 2003). It is about (0.91).

(U) Utilize technology, multimedia & materials:

This step of ASSURE model related to set up an integrated plan to use technology, multimedia and materials that the teacher has identified. As in all educational steps, the teacher has to ensure that his/ her plans contribute to achieve these goals. It means that prior planning for using these equipment is important, and the teacher has to practice on his lesson before commencing it to guarantee that his/ her lesson will go smoothly (Laurillard, 2002). This step includes the following:

- Preparing technology, media and materials: the teacher has to gather all materials he/ she needs in class, and the teacher should make sure that these materials are working properly. For example, if there is a presentation about plants cells, the teacher will need prepare texts and drawings for each slide. Data show is used and connected to speakers. Also, there are 20 power point slides for each subject. This step includes providing students with email addresses to receive their homework (Xiao-hua, 2007).

- Preparing the environment: there are some preparations the teacher has to do to prepare the educational environment. One of these things is the students desks should be organized and sufficient for the students. Moreover, the teacher should have full control over his class and there is no source of noise that disturbs the students (Prosser & Trigwell, 1997). This step is verified because the teaching happened in the laboratory of Science text book of the 4th stage that is equipped with required equipment in addition to sufficient number of chairs for the students.

- Preparing teachers: in the beginning, the teacher has to tell students about learning goals, which will help students to establish mental map to what they want to understand. Also, it is important to tell students how to evaluate them. The teacher has to tell them about their duties, how to do tests..... etc. the students should understand the benefits of their studying materials (Arends & Castle, 1991). This step is verified through training students on using emails to check their activities and how to solve their homework and tests they received by email on daily basis (Clark & Mayer, 2016).

- Preparing learning experiment: when the teacher in the class implemented the lesson, actually, he/she implements what the teacher planned for. So, the teacher has to be ready for the lesson taking into consideration previous steps, which will ensure the lesson success (Roblyer & Doering, 2006). The teacher employs the experimental design (Federer, 1955). The experimental researches in the educational and psychological sciences require experimental design to get reliable outcomes. It is hidden from no one that experimental design is a work plan enables the researcher to implement his/ her work properly (Christensen, Johnson, Turner, & Christensen, 2011). The experimental design of partial adjustment for the two equivalent groups, the experimental group and posttest control group will depend on An ASSURE-model instructional design based on Active learning represents (independent variable) and academic achievement and high order thinking skills represents (dependent variables) as shown in table (5).

### Table 5: Experimental design.

<table>
<thead>
<tr>
<th>No.</th>
<th>Groups</th>
<th>Groups equivalency</th>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>experimental</td>
<td>- Age</td>
<td>An ASSURE-model</td>
<td>1. Achievement</td>
<td>1. Achievement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Previous achievement</td>
<td>instructional design</td>
<td>2. High order</td>
<td>2. High order</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Previous biological information</td>
<td>based on Active learning</td>
<td>thinking skills</td>
<td>thinking skills</td>
</tr>
<tr>
<td>2</td>
<td>control</td>
<td></td>
<td>Regular method</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(R) Require learners' participation:

The teacher is required to set up plans for students’ participation in the subjects, and the teacher has to be fair with all his/ her students. The basic step requires students’ participation in the classroom discussion. The teacher has to follow more developed method that allows students to prepare questions and comments at home then bring them to school. Also, the teacher may allow for some students to lead discussions and seminars (Peterson, 2010). The process is achieved through taking sample of research, which is defined as a part of the study population selected by the researcher to conduct his/ her study according to scientific rules. The selection of the sample is conducted because of the difficulty of studying all the study individuals due to economic and practical studies (Sterba, 2009). Hamurabi intermediate school for boys is selected as a study sample. It is divided into two equivalent groups in (age, previous achievement and intelligence) variables then T calculated value is compared to tabular value at (0.05) significance level and (69) freedom degree, so the two groups are equivalent. Table (6) shows this.

### Table 6: Equivalency between the study groups in (age, previous achievement and intelligence variables).

<table>
<thead>
<tr>
<th>Equivalency variable</th>
<th>group</th>
<th>No.</th>
<th>mean</th>
<th>Standard deviation</th>
<th>t calculated value</th>
<th>decision</th>
</tr>
</thead>
</table>

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The implementation of this step is verified through distributing duties on students fairly to ensure the participation of the major number of students, as the following:
- Daily electronic evaluation: the students feel there is some sort of justice in distributing duties among students and involve them in the execution of the lesson
- Do daily homework through sending them via emails.

**(E) Evaluation and Revision:**

The step is the last in An ASSURE-model instructional design and it is as important as other previous steps.it evaluates the effect of teaching on students' performance and learning. The step includes an evaluation of teaching strategies and the techniques and materials used in teaching (MacArthur, 2007). The following questions can contribute to achieve this step:

- Does the teacher achieve teaching goals? How does the teacher decide whether the students will reach to these goals? Does your way of evaluating students agree with your educational goals?
- Can we improve this lesson? How? How do you evaluate your design weaknesses?
- Is your use of educational aids reasonable? How do you evaluate the efficiency of these aids?
- Can other techniques, educational aids and materials do better than those already used?

This step is implemented through daily activities and tests introduced for students via email in addition to paper, oral, preliminary, formative and final tests.

**Results**

*The current study aims to*

1- Construct learning design based on an ASSURE model for the 1st intermediate stage in Science text book.

The designing and constructing processes are accomplished according to the model steps.

2- Identify the effect of proposed an ASSURE-model instructional design based on Active learning on the higher thinking skills of the 1st intermediate stage in Science text book.

In order to verify these two goals, null hypothesis is tested (there is no difference of statistical significance at (0.05) among the means of the marks of the experimental group who studied according to An ASSURE-model instructional design based on Active learning and the means of marks of the control group who studied according to traditional method). After calculation the two means and standard deviation of the two groups and comparing them using two independent samples T-test, the T calculated value is (3.154), which is higher than the tabular value (2.00). It indicates that there is a difference between the two groups of the study in favour of experimental group. So, null hypothesis is rejected and the alternative hypothesis is used due to the proposed method of teaching. Table (7) shows this case:

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>t</th>
<th>Sig. (2-tailed) 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>35</td>
<td>30.0571</td>
<td>1.51352</td>
<td>0.25583</td>
<td>3.154</td>
<td>0.000</td>
</tr>
<tr>
<td>Control</td>
<td>35</td>
<td>28.6286</td>
<td>2.21075</td>
<td>0.37368</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Effect size**

Is the ratio of difference of the dependent variable due to the value of independent variable? It refers to the big roles that the condition of the independent variable play to specify marks on the dependent variable (Nakagawa & Cuthill, 2007). It also refers to the effect measure by Practical Significance. To calculate practical significance and show the effect size of the independent variable Cohen,1988) (Preacher & Kelley, 2011) (proposed An ASSURE-model instructional design based on Active learning) on the dependent variable (higher thinking skills) then calculate the effect scale by applying Eta Squared on t-calculated value then (d) value and compare the value of effect scale with. Table (8) shown that.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>t-calculated degree</th>
<th>Freedom degree</th>
<th>Eta value</th>
<th>d</th>
<th>Magnitude of effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed learning</td>
<td>Higher thinking</td>
<td>3.154</td>
<td>68</td>
<td>0.469</td>
<td>1.36</td>
<td>big</td>
</tr>
</tbody>
</table>

The above table shows that the value of effect scale (d) of the proposed an ASSURE-model instructional design based on Active learning is (1.88) and it is high indicator according to (Cohen, 1988) standards because it is higher than (0.8) and this indicates that the independent variable has a big effect on the dependent one. This result can be explained in terms that the proposed learning design has an effect on higher thinking skills to include it in the strategies of active learning, learning technology and blended learning.
Conclusion

1- The efficiency of teaching according to An ASSURE-model instructional design based on Active learning proposed, which contributes to increase the level of higher thinking skills.
2- The ability to employ An ASSURE-model instructional design based on Active learning to teach Science text book for the intermediate stage by the available facilities of the schools.

Recommendations

The researcher recommends the following:
1-Using of An ASSURE-model instructional design based on Active learning by teachers.
2- The necessity to develop higher thinking skills for the students of the intermediate stage of different classes in physics.
3- Conduct on the job- training for the teachers of Science text book on using the ASSURE- based proposed learning design.

Suggestions

1- Investigate the effect of other learning designs of different models in other variables.
2- Investigate the effect of An ASSURE-model instructional design based on Active learning in different stages.
3- Investigate the effect of An ASSURE-model instructional design based on Active learning on teaching other subjects like chemistry and physics.
4- Construct a proposed program to train teachers of Science text book to use An ASSURE-model instructional design based on Active learning to teach different stages.
   The efficiency of wrong alternatives of objective items in higher thinking skills.

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