The Effect of Using Wood's Model in Systemic Thinking Skills Among Students in Second Grade Intermediate in Mathematics

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Abstract: This research was conducted in Iraq and it aimed to identify the effect of using Wood's model in systemic thinking skills among the students of the second grade intermediate. The sample consisted of (71) students from second grade intermediate and distributed into two groups (36) represented the experimental group who were using taught by using Wood's model and (35) represented the control group who taught by the traditional way. The whole sample was equalized in a number of variables including (chronological age, previous achievement, intelligence). Then lesson plans for teaching Wood's model and lesson plans for teaching by the traditional way for four chapters (polynomials, inequalities, match triangles, volumes) have been prepared. A test for measuring skills of systemic thinking was adopted. All the necessary psychometric properties of the test were achieved. At the end of the experiment the test which consisted of (21) items was applied. After the application of the test, data were treated statistically using t-test formula. The following result were founded: Wood's model helps to develop the skills of systemic thinking among students and the researcher suggested the need to adopt other models of the theory of constructivism and their impact on systemic thinking skills.

Keywords: Wood's Model, Systemic Thinking Skills, Mathematics

1. Introduction

1.1. Problem of the Study

The majority of teachers of mathematics are explaining mathematical topics as it is existed in the textbook without the adoption of any model of teaching which sends the spirit of vitality and thrill to these topics, that makes it dry and complex, this makes the majority of learners complain of the difficulty of learning the mathematical subjects, forcing them to memorize examples and exercises, theories, and even sequence of mathematical topics without meaning, and this naturally leads to weakness in the academic achievement of learners and this is confirmed by of [5] study. Also, Teaching which based on memorization of review without trying to connect the old and new concepts and presenting things superficial and disjointed themes for Math; weakness caused by the weakens teachers to realize the philosophy of mathematics curriculum, leading to weakness of the development of thinking of learners and weak in connecting mathematical topics in meaningful systems. This was confirmed by the study of [12] study. Depending on the mentioned above, the study problem is highlighted by attempting to answer the following question: What is the impact of the use of the (Wood's) model in systemic thinking skills among students in second grade intermediate in mathematics.

1.2. The Importance of the Study

Mathematics helps to develop a lot of mental capacity and its growth (such as strength thinking and proof, and induction and deduction, and creativity and originality of Visual Ranking R., imagination, circular, and discovery, ...) and others, also every issue of maths contains an intellectual challenge, and this is a good exercise for the mind [6]. The highlighting of relationships between concepts in mathematical content helps the formation of the structure of mathematical cognitive, which leads to the acquisition of
complete awareness and comprehensive the learner of the problem or situation dimensions that he/she faced, so he/she starts with a holistic perspective, and relationship of all to parts and the relationship of the parts to each other, and the relation of each including the overall position of the subject matter of learning, and manage the process of thinking and thinking about thinking Metacognition [4]. So, lots of researchers and educators worked to find a number of models to help students to facilitate the process of learning and correct their misunderstanding concepts and the formation of new concepts. Among those modern models that are designed for the process of conceptual changing is (Wood's) model which appeared in 1991. It has been used in order to assist students in getting rid of the misunderstanding concepts which they have. The model is composed of three stages (prediction, observation, and interpretation) the learner exercise of these mental processes, assisted him/her in changing his/her cognitive structure. Hence, these concepts help to solve some learning difficulties, where is what comes of them first used as the core of what would come after it, also it helps on the organization of mental experience. The concepts are considered basic tool of thinking and survey of school curriculum, so it should be made more attention to its arrangement and development to students [14]. If learner realized in all its aspects and consider it as a general connect frame, he would be able to represent the situation in the form of a system of general that connects its general parts to each to each other, and the relationship of each part of the system overall, because the brain works as a system situation general, according to building systemic codes. So wood's model with three stages (prediction- note- Interpretation) was adopted in the teaching of mathematical concepts and its reflection extent on the organization of systems thinking skills and approved by the students in the study of mathematics realizing systematic the relationships between mathematical concepts.

So, the importance of the research is highlighted by the following points:

1. The need to adopt new and interesting models makes the learner effective in the teaching of mathematical concepts such as Wood’s model.

2. Math is considered an integrated system, So the good teaching is, what reflects such a system in the minds of the students. The students' ability to find relationships between mathematical concepts and constructed them can make him/her continue to study mathematics.

3. The importance of mathematical thinking skills, and particularly in the intermediate stage, according importance of this stage in the growth of mental abilities of the students.

1.4. Hypothesis of the Study

In order to achieve the study aim, the following hypothesis are made:

There is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who have been taught according to Wood's model and the mean scores of control group students who have been taught by the traditional way in the systematic thinking skills test.

1.5. Limits of the Study

This study is limited to:

1. Second grade intermediate students for the academic year (2012-2013), and it was limited to four chapters of school textbook including. (polynomials, inequalities, match triangles, volumes).

2. Wood's model which included three stages (prediction, and observation, and interpretation)

3. The systemic thinking skills which are (dynamic, and closed-loop, and generic, and structural, and operational, and scientific, and the continuum)

1.6. Definitions of Basic Terms

Wood's Model:

According to the novelty of the model, researcher did not find definitions of the model and believes that the theoretical definition of Wood’s model is the process of teaching used in the classroom to make students engage in a range of mental processes which are (prediction, observation, and interpretation) in a sequential order to reach the ultimate goal of the lesson. While operational definition of Wood’s model is: ((a set of procedures practiced by the teacher in preparing lesson plans according to the mental processes (prediction, observation, and interpretation) that have been identified by Wood’s in his model and made its implementation by second-grade students in a small cooperative groups inside the classroom.))

Systemic Thinking Skills: It Was Defined By:

[11] as “a number of ingredients, including analysis systems to subsystems, with the re-installation and arrangement of these systems in the context of the research topic”.

[1] as “a set of skills that fit with the concept of systems thinking, from where they contain the analysis and installation, through the analysis of systems to major subsystems, and to identify the components, and the relationships that bind these components, and then build relationships according to a new understanding of the relations between these components”.

1.7. Operational Definition

“system of interrelated mental processes which second grade intermediate students can through them adopt the following skills, namely, (dynamic, closed-loop, generic, structural, operational, scientific, and the continuum). So, a
holistic view of the mathematical subject of to be learned and worked on the construction by identifying relations related to it and measured by the marks which the sample students obtained through test prepared for this purpose.”

2. Theoretical Background

2.1. Wood’s Model: Origins of Wood’s Model

The idea of this model was developed by Robin Wood’s. Since he was teaching his child at home where he was impressed how the kids learn the basic skills in reading and writing, especially in their attempts to interpret the natural world. This admiration was Crystallized after several years when he became a teacher of science and found variation in interpretations of his students totaling (50) pupils from the fifth grade of the natural world around them. So, his desire to understand how children learn science was renewed when he met (Richard Thorley) in 1991 Assistant professor in the physics education of specialist, who ran a workshop under the supervision of the University of (Rochester) about the science of changing the concept and produced. The discussed results for the selection of a topic in electrical questions and promising for the detection of the child’s innate learning theories about science such as one priming bulbs or cut one wire of an electrical circuit and teaching was in a small group according to the following steps:

(1) The pupils predict the phenomenon.
(2) Make experiences on the basis of their predictions and note the results.
(3) If their theories constricted with empirical evidence students must help to move from incorrect theories to the correct scientific explanation. [15].

2.2. Phases of Wood’s Model

Wood’s designed teaching made and implemented in physics chemistry laboratory. Its aim was to help learners to abandon their Incorrect concepts. The work is done in small groups and includes the following stages:

(1) Prediction: learners are asked to predict the outcome of experiments.
(2) Observing: learners are observing the through scientific experiment and record observations and reach to the results.
(3) Explanation: learners are asked to explain the results in light of previous theories and ideas and then to reach a proper scientific explanation. [15]

2.3. Systemic Thinking Skills

Richmond pointed to that there are seven systemic thinking skills work together and at one time associated significantly with which is Systemic dynamic Model (SD).

(1) Dynamic thinking: (Dynamic Thinking): Any thinking about the problem as a result of ongoing operations circular appear over time and not just thinking about it as a result of a combination of factors.
(2) Closed-loop thinking: this thinking reflects skill benefit from the results of the analysis of the situation in the construction process, that is understanding of the nature of cyclic systems, which is linked to significantly dynamic thinking, and this means thinking about the problem as a group from continuing operations and dependent on each other more than just thinking about it as based on one-way relations between the components of the problem, and therefore when we look at the problem we believe that it is rings (circular relationship between cause and effect), so that these rings are responsible for the generation of patterns of behavior that appear in the problem, i.e., that the relationship between cause and effect is not a one-way, but the result leads to feedback in order to affect one or more of the reasons, and these same causes affect each other.
(3) Generic Thinking: (Skill of holistic view of the situation or the problem): It means the general vision of the system, the ability to the overall vision of the relations that link the component parts of the system.
(4) Structural thinking: It means the ability to organize parts of the system within the framework or structure of relationships.
(5) Procedural Operational Thinking: (Looks at the structure of relations): it is the individual’s ability to notice how they affect each other in some parts and not just stand at the extent that these parts affect each other, practical thinking helps in identifying the idea of mutual influence between the component parts of the system.
(6) Scientific thinking: (Common scientific thinking skills).
(7) Continuum Thinking: it means that which skill monitors the invisible mutual relations and identified them in the sense to reach a construction as thinking deeply connected with a panoramic view of the mutual relations between the elements of the situation. [13]

From the above, the importance of developing systems thinking of the skills clarified by supplying purposeful and that meaningful giving systems help the learner the construct his knowledge, analyses it and to insight the relationships quickly and accurately through a general vision of the system retina and dynamic interacting with nature each other. These skills will help to prepare generations armed with systemic, thinking. So the researcher has adopted Richmond classification. After taking the views of experts and discussing it’s suitability to the thinking processes of intermediate learners.

2.4. Previous Studies

First: aspect of Wood’s Model studies:

(1) [15] study :.The study was conducted in the UK and aimed to: identity the effect of (prediction, observation, and explanation) in the making of conceptual change among students of the fifth grade on the subject of electrical circuits. The study sample
included (50) pupils, the experiment lasted for (16) weeks. At the end of experience. The test results has shown that teaching according to (prediction, observation, and explanation) has made clear and an effective impact on re-construction of the cognitive structure for students cognitive structure for students and change their porous knowledge.

(2) [2] study: The study was conducted in Iraq and aimed at identifying the impact of Wood’s model in the collection of the fifth grade students achievement in science. The Sample consisted of (60) pupils and the research tool was an achievement test. The experiment lasted for (11) weeks, and after the end of the experiment results showed superiority of the experimental group that had been taught according Wood’s model their on peers in the control group, who had been taught by the traditional way in achievement.

(3) [10] study: The study was conducted in Iraq and aimed at identifying the effect of Wood’s model conceptual map and in changing the incorrect Understanding chemical concepts students at the second grade intermediate. The incorrect concepts been diagnosed by using a diagnostic test and the test results showed that there was (16) misunderstood concept out of (31) and the number of students were (60) students. A post achievement test was applied. Results showed the superiority of the experimental group who taught according to the conceptual strategy map, and the group who taught to by the traditional way, but there is no statistically significant difference between the experimental group that taught according to Wood’s model and the group that taught by the traditional way in the achievement test, but there is a spiritual difference between the two experimental groups.

Second: aspect of systematic thinking skills studies:

[3] study: This study was conducted in Iraq aimed at finding out "the effectiveness of the teaching – learning program according of the systemic entrance in mathematics to develop the systemic thinking skills and metacognitive skills and the academic achievement for the students of the second year intermediate". The study sample consisted of (59) female students distributed into two groups and after the application of experience the following conclusions were obtained: There was a difference between the experimental group who taught according to the teaching - learning program of the systemic entrance and control group who taught according to the traditional way in the systematic thinking skills test in favor the experimental group. The benefits of previous studies: To have advantage of the results of previous studies in highlighting the problem of the study and its importance. The advantage of statistical methods used in previous studies to select the appropriate statistical methods to the study. And in the selection of appropriate experimental design and sample size. Some the of the results of these studies can be useful in interpreting the results of this study.

3. Materials and Methods

3.1. Study Procedures

First: The experimental Design: The researcher used the equalized groups design with partial seizure design, which includes the experimental group which taught mathematics according to Wood’s model, and the control group which taught mathematics by the traditional as illustrated in table (1).

<table>
<thead>
<tr>
<th>Group</th>
<th>Equal Groups</th>
<th>Independent variable</th>
<th>The dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td></td>
<td>Wood’s model</td>
<td>Systemic thinking skills</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Second: Choose the community and, sample of the study: The Current study community represents all second grade, intermediate students in Baghdad city. The study sample have been selected from AL-aisa intermediate school for girls in Al- Karkh the first (71) female students were the total number of the sample where (36) represented the experimental group and (35) represented control group.

Third: Equalization of groups: Before start applying the experiment, the two groups of students of study were equalized in some of the variables that may affect the results of the study:

(1) Chronological age variable.
(2) Previous achievement in mathematics variable.
(3) IQ test Variable.
(4) Educational level of the parents variable.

It was noticed that the value of the calculated “t” is less than value of tabulated “t” at the level of significance (0.05) and the grade of freedom (69) as it is shown in table (2) and the result of Chi-square test concerning the educational level of the parents, as it is shown in table (3) of both groups which confirms that the groups are equalized in these variables.

<table>
<thead>
<tr>
<th>Variable valence</th>
<th>Group</th>
<th>Number</th>
<th>SMA</th>
<th>Standard deviation</th>
<th>Contrast</th>
<th>Value of “t” Calculated</th>
<th>Tabulated</th>
<th>When the level of statistical significance (0.05) grades of freedom 69</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Experimental</td>
<td>36</td>
<td>167.139</td>
<td>8.787</td>
<td>77.209</td>
<td>1.472</td>
<td>2</td>
<td>Not statistically significant</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>35</td>
<td>164.257</td>
<td>7.652</td>
<td>58.550</td>
<td>5.012</td>
<td>2</td>
<td>Not statistically significant</td>
</tr>
<tr>
<td>previous achievement in mathematics</td>
<td>Experimental</td>
<td>36</td>
<td>67.167</td>
<td>14.692</td>
<td>215.857</td>
<td>0.717</td>
<td>2</td>
<td>Not statistically significant</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>35</td>
<td>69.457</td>
<td>12.057</td>
<td>145.373</td>
<td>2</td>
<td>Not statistically significant</td>
<td></td>
</tr>
<tr>
<td>IQ</td>
<td>Experimental</td>
<td>36</td>
<td>34.861</td>
<td>5.963</td>
<td>35.552</td>
<td>0.893</td>
<td>2</td>
<td>Not statistically significant</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>35</td>
<td>33.657</td>
<td>5.368</td>
<td>28.820</td>
<td>2</td>
<td>Not statistically significant</td>
<td></td>
</tr>
</tbody>
</table>
3.2. Study Requirements

Preparing lesson plans and objectives:
The researcher has prepared lesson plans within the scientific material-specific chapters (polynomials, inequalities, match triangles, volumes). The behavioral objectives were put on the basis of these lesson plans. Then these objectives were distributed on the three lower levels of Bloom's taxonomy for cognitive field. These objectives were exposed on a group of experts in mathematics and methods of teaching Plans, and by plans in the week and for lesson duration (45) minutes, samples of these plans were exposed on a group of experts and arbitrators in mathematics and methods of teaching and teachers, to take advantage of their opinions and suggestions, the necessary modification have been carried out, as illustrated by appendix (1)

3.3. Study Tool (the Test)
The systematic thinking skills test preparation:
The researcher adopted [3] test because it is identical somewhat with the characteristics of study, which aimed to measure the skills of systematic thinking of concepts, generalizations and accumulated skills of female students as well as the course material within the limits of the experiment, according to the identified systematic thinking skills that suit the second year intermediate student, which are seven- systemic thinking skills, as namely: (dynamic think, closed-loop thinking, generic thinking, procedural operational thinking, continuum thinking, scientific thinking, structural thinking ) the test consisted of (21) questions where each skill includes(3)items as the weighting grade of each item (system) between (0-4), when the student answers to one sub-system within the basic system, that means only one grade, is counted.

(1) The test validity: The test was exposed to a number of experts and arbitrators in mathematics and methods of teaching and the measurement and evaluation, to show their opinions about the test items as illustrated in appendix (2). In the light of the opinions of experts the items that have the validity of (92%) and more were kept. With the modification of Some items, the test in its final version became ready to be applied, as in appendix (8). Thus, the test validity is achieved.

(2) Statistical analysis of the systematic thinking skill test items: The test was applied to sample of (126)female students in Cairo secondary for girls followed to the Directorate-General for Education BAGHDAD / Rusafa first, on Monday, 11/4/2012, after the correcting the answers, the researcher arranged grades represented by in descending order For the purpose of determining the two extremes which (27% of the highest grade of high group) and (27% of the lowest to west grade of lower group, as the number of students in each group was (34), student at higher group and (34) student at the lower group, then following statistical analysis for the two groups were conducted:

(3) Difficulty level of items: The systematic thinking test items of objective answer and essay were calculated by using the difficulty formula for each of them. It has been found that it ranged from (0.23 – 0.72) which fall within the acceptable limits. In this respect Bloom (1971,96) states that any item has the difficulty level ranged from (0.20 – 0.80) is acceptable.

(4) Discrimination Power: the discriminatory power was calculated for each item of the systematic thinking skills test, according to the formula of discrimination.Because of that they are ranged between (24.0 to 55.0), the item is considered good if it is more than (0.20 - 0.80). [9]

(5) Reliability of the test: For the purpose of calculating the internal consistency of systemic thinking skills of the sample “Alpha Cronbach ” was applied. In the light of students’ responses which reached (0.98) which is greater than the minimum range required by the Educational Studies and Social Development. [9]

(6) Constant correction: (45) pilot sample answer sheets were selected randomly for the purpose of calculating

<table>
<thead>
<tr>
<th>The level of academic achievement</th>
<th>Group</th>
<th>Number of sample</th>
<th>Aptdaaahfma without</th>
<th>Medium</th>
<th>Junior high</th>
<th>Diploma</th>
<th>Bachelor or above</th>
<th>Chi-square (Ca)</th>
<th>When the level of significance (050.0) The grade of freedom(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To mother</td>
<td>Experimental</td>
<td>36</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>2.46</td>
<td>Not statistically significant</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>35</td>
<td>6</td>
<td>11</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>9.49</td>
<td>Not statistically significant</td>
</tr>
<tr>
<td>For father</td>
<td>Experimental</td>
<td>36</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>9</td>
<td>2</td>
<td>3.87</td>
<td>9.4</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>35</td>
<td>12</td>
<td>13</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>9.4</td>
</tr>
</tbody>
</table>

Table 3. Chi-square statistics for the educational level of the subject’s father and mother.
the reliability of correcting the overtime. The researcher has re-corrected after seven days of the first correction and by using (Cooper) formula. The results showed that the percentage of agreement the two correcting reached (92.0), and then was re-corrected again by the researcher by using the same formula, The percentage of agreement between the researcher and the School teacher of Mathematics correcting was (93.0) and this is high reliability coefficient [7], After making sure of the test validity reliability and the statistical analysis of its items, It is ready to be applied.

3.4. The Experiment Application

After preparing the experiment requirements and preparing lesson plans for the experimental and the control group and controlling the variables affecting the experiment and after dividing students to equal groups. The school teacher of mathematics started teaching on 25/11/2012 and finished on 26/4/2013. According to the following procedures:

1. Applying lesson plans devoted to the experimental group according to Wood’s model and following these steps:
   A. The division of students into (5) groups, (4) students at each group from the beginning of the year.
   B. Preparing of the subject matter by the school teacher through clarification.
   C. Submitting a working paper for each group in each lesson: where the teacher asks students in work paper to:
      (1) Predict solution by developing a solving plan to each student in the group separately. the purpose is to make every student think by himself in developing a plan to resolve the mathematical problem question proof his own activity record.
      (2) Observe the applying of colleagues in the same group and participation to reach the correct solution in a worksheet, recording the solution in the activity record.
      (3) Interpretation of the solution in the activity record of each student individually by his own style in order to develop the spirit of interpretation and mathematical expression among students.
      (4) Each group display the right solution on the board.

2. Applying lesson plans for the control group according to the traditional method, according to the order of material in their textbook.

3.5. Statistical Methods

(1) t-test for two independent samples: It is used to equalize and analysis of results.
(2) Difficulty level: it is used to calculate the difficulty level of objectivity and essay items of the systematic thinking skill test.
(3) Discrimination power: it is used to find the discrimination power of objectivity and essay test items of the systematic thinking skill.
(4) Chi-Square formula: It is used for equalizing both groups of the study in their parents education level.
(5) Cooper formula: It is used to calculate the correcting of essay questions of the systematic thinking skill test.
(6) Alpha- Cronbach's formula: It is used to calculate the reliability of questions systematic thinking skill test. [7] and [9]).

4. Results Interpretation

There is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who taught, according to Wood’s model and the mean scores of control group students who taught by the traditional method in the systematic thinking skills test as illustrated in table (4).

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>The mean scores</th>
<th>Standard deviation</th>
<th>Value (t-test)</th>
<th>Statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Calculated</td>
<td>Tabulated</td>
</tr>
<tr>
<td>Experimental</td>
<td>36</td>
<td>49.25</td>
<td>12.717</td>
<td>8.23</td>
<td>2</td>
</tr>
<tr>
<td>Control</td>
<td>35</td>
<td>24.657</td>
<td>8.564</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As it is shown in table (4) that the “t” is that calculated value (8.23), which is greater than the tabulated value (2), which indicates there is statistically significant difference at the level of (05.0) and the degree of freedom (69), as the results show the superiority of the experimental group students who taught according to Wood’s model on the control group who taught according to the traditional method on the systematic thinking skills test. The reason for the increase in the experimental group resulting from the teaching according to Wood’s model may be due to the following reasons:

(1) The interaction that occurs during Wood’s model phases which the student may have deeper look into the mathematical subject and relationships that created...
between it and other mathematical topics as in the studies of [2] and [10]

(2) Teaching according to Wood’s model helped to configure meaningful systems in the minds of students through the modification to what they have gained of incorrect or mathematical information emphasis on correct mathematical information, So he will from successful solution plans in his mind that he would use them in new mathematical situation.

5. Conclusions

In the light of the study results, it has been conclude that:

(1) Wood’s model provided, the increase among second grade students intermediate, and Wood’s model ensures that the student works on individually and collectively so the student will be effective and positive with the teacher and with his fellow students.

(2) The need to focus on the systematic thinking skills because it supports the student with the overall perception of the subject and the relationships that interpose parts and sub-systems so it differs from other kinds of thinking skills.

Recommendations

In light of the study results, the following recommendations are made:

(1) The need for training on old and modern teaching models by the ministry of education. So that, the teacher would be able to face all the teaching situations positively aiming at delivering the mathematical material in the best way and making the culture of teaching for the teacher.

(2) Colleges of Education should adopt a variety of teaching models in the preparation programs to promote the educational process.

Suggestions

In light of the study results, the following suggestions are put forward:

(1) The effect of using Wood’s model in academic achievement for second grade students intermediate.

(2) The effect of using other teaching models and its impact on systemic thinking skills.

Appendix 1

A daily lesson plan according to Wood’s model
Lesson: Mathematics Grade: second intermediate
Topic: prism time share: 45 minutes
First: behavioral objectives:
AT the end of the lesson the student is able to:

(1) Know prism.

(2) Recognize through drawing on the heads of the two databases prism.

(3) Recognize through drawing on characters bases of the prism.

(4) Recognize the drawing through the prism based on height.

(5) Specify the number of aspects of the prism.

(6) Recognize the mathematical relationships by linking new concepts concept earlier.

(7) Discover the relationship between the base and the prism section parallel to the base.

(8) Conclude the space side of the prism.

(9) Find space in the side of the prism.

(10) Conclude the surface area of a prism.

(11) Find the surface area of a prism.

(12) Deduce the size of the prism.

(13) Find the size of the prism.

Second: The teaching aids: blackboard, blackboard colored pens.

Third: Steps to implement the lesson (educational activities learning)

1. Introduction (configuration): at the Previous stage you had knowledge about Spaces and volumes of each of the cube and cuboid:

   Teacher: What area of the side of the cube?
   Student: space side of the cube = 4 (character length) ².

   Teacher: What is the surface area of a cube or college?
   Student: the total area of a cube = 6 (character length) ².

   Teacher: What is the size of a cube?
   Student: the size of the cube = (length character) ³.

   Here shows that the school is one of the types of the cube prism quartet had previously taught at an earlier stage and has a side area and the size of the College and has also been touched upon.

2. Width: - So lesson today is about the prism.

   Teacher: called the figure next Prism.
   Teacher: What are the two octagons which define the bases of the prism?


   Teacher: What are the areas of the rectangular prism?
   Student: rectangular areas of the prism M G , D , G K , G K Define the rectangular prism.

   Teacher: What are the ribs rectangles that define side-faceted prism?
   Student: ribs rectangles that define the faceted side F G , K K , D D

   Teacher: So-called triple or quadruple the prism or pentagons. according to the number of ribs is the base Vamoose Prism.

Figure 1. Penta prism.
These forms we call Prism-based, and is all of the cube and cuboid and cylinder of special cases of the prism.

If the characters are perpendicular to each side of Hadtah called Balmosor quo, but if the side characters are not perpendicular to each of Hadtah called Balmosor italics.

For the prism side surface area and volume of the following laws:

**The teacher:** The following example shows the cooperative groups for students:

*Example:* tri-based prism height of 12 meters and its base in the form of a triangle-based dimensions of 6.8, 10, meters, calculate the area of the side and its surface area?

**Prediction phase:** After viewing the question on the aggregates begin registering students forecasts then about how to get to the solution to allow them to think individually.

**Observation phase:** Group meets and begin applying solutions through discussion and consultation among themselves

Space side of the prism = perimeter of the base × height

LA = (P) (H)

LA = (6 +8 +10) (12)

LA = 24×12

LA = 288 cm²

The surface area of a prism = area-based side + space rules

S. A = 288 + 2 (1/2 × 6 ÷ 8)

S. A = 288 + 48

S. A = 336 cm²

**Interpretation stage:** students begin to interpret reach LES step by step and codified in the registry activity with the solution, drawing and illustration and then comes the role of the school in pursuing the right solutions and the amendment to the solutions and interpretations and erroneous predictions clarification after the presentation of the students solutions and interpretations.

**Fourth: Evaluation:**

1. a. Is the form of al-Qaeda is determined by the type of prism?
2. b. Metal plate in the form of a prism-based quartet square-shaped base side length cm And a height of 10 cm 15, grandfather space side of the prism?

**Fifth: Homework:** resolve questions (1.2, 3, 4.7) of the exercises (1-8).

**Appendix 2**

**Example System: Dynamic Thinking**

*Complete the process sequence for the beating to illustrate the mathematical relationships*

![Figure 1a. Dynamic thinking.](image1)

![Figure 2a. structural thinking.](image2)

**Example System: structural thinking**

*Fill the form with appropriate following concepts:

(Coordinate system on a straight, coordinate system on a flat, horizontal coordinate axis, vertical axis coordinate):*

![Figure 2b. Solution structural thinking.](image3)

**Example System: Closed- loop thinking**

*Type relationships affecting each share Association in the*
I. The relationship (1) is...............  
II. The relationship (2) is...............  
III. The relationship (3) is...............  
IV. The relationship (4) is...............  
**Solution System:**  
I. The relationship (1) is half  
II. The relationship (2) is four proverbs  
III. The relationship (3) is equal  
IV. The relationship (4) is double  
**Example System: operational thinking**

*Complete the form so that the relationship between the parts be logical*

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*If the number of sides the any polygon total angles measurements of the polygon  
n = .......... terms.  
**Solution System:** *If the number of sides the any polygon total angles measurements of the polygon  
n = (n -2)180 terms.  
**Example System: scientific thinking**  
*Before you figure in a clockwise direction, explained how to get to the number by completing the missing relations so that the logical relationship be true:*

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*Example System: continuum thinking  
*Complete the missing part, so the logical relationship between the numbers be correct*
Rafah Aziz Kareem: The Effect of Using Wood's Model in Systemic Thinking Skills Among Students in Second Grade Intermediate in Mathematics

Figure 7a. Continuum thinking.

Figure 7b. Solution continuum thinking.

References


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