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Study investigative method and teaching techniques based on it (a new approach to education)

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ABSTRACT

Education students, as if they were happy, and obtain the necessary skills to solve problems and enable to proper decisions about their personal and social issues, is slightly scholars of Training and practitioners, and policy makers of education. This requires the use of modern teaching methods in education. One of the new methods of teaching that has many applications is discovery. Discovery method is based on learning search process and explains phenomena. In this paper, in order to be familiar with this approach, concepts, nature, structure and teaching methods are defined based on the discovery. Teaching techniques, such as exploratory learning and experimental Teaching methods.

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Introduction

With theoretical evolution and nature of science, new approaches are discussed in the educational objectives and learning process (Vermunt & Endedijk, 2011). The concept of education in today's world is different from the past. Developments of science and technology have made irrefutable need for change in the educational activity. Never can look to the students and their training with the old attitudes and biases. Today's educational system must nurture the forces that are capable of understanding the complex world and behave rationally. Such people are able to influence society (Richardson, 2011).

According to new scientific insights, intellectual information, or some level of basic skills, is not complete learning, And does not account for the main purpose of education. Today, the lecture by the teacher is not the only factor in education. Rather, Effective teaching is associated with positive learning activities, and lead to a more productive experience (mirzabeigi, 1380).

So, one of the most important developments in education systems, changes in attitudes and teaching methods of teachers and administrators of the school system (shabani, 1382; Huber, 2003). In addition during the past three decades, the foundations of cognitive psychology of learning, teacher-centered approaches gradually changed to learner-centered approaches. This vision has delegated more responsibility in learning to learners (Chiang, Chapman, and Elder, 2010). One of the new approaches in the educational activity is based-discovery instruction. In this approach, the teacher created a new position with confusion, forcing the students to think and search (Mtika & Gates, 2010).

Discovery Teaching Methods

Richard Sachmn develops the discovery teaching method to search the Processes and explain phenomena. Sachmn model that has been developed, involve students in the processes, that researchers use for their to organize knowledge of emerging technologies and "principles". According to the concepts of the

scientific method, through the discovery teaching methods, study skills and specific language will be learned (aghazadeh, 1998). Using the discovery teaching methods, the students will develop mental and physical abilities. This activity makes them that about topics (a problem) ask relevant questions, Search and collect information. Test the data, propose the solutions, and implement the Test, Pluralization, conclusions and change findings. Offer their opinions on others. Communicate with them. Finally, while the emphasis on the results of their work, reviewed and compared, the opinions and the results of others Work. And be flexible to find better and more complete answer. Thus, while using discovery methods, will develop all the skills required in science education, and many of the attitudes (amani tehrani, 2001).

Purposes of discovery Teaching Methods

The overall goal of the discovery Teaching Methods, help to student In order to create a rational and skills necessary to develop research and questions to answer them, Based on their own curiosity (Joyce and Weil, translated by Behrang, 1999). Assumptions about discovery

Basis of that assumption here about the discovery is presented, based on the hundreds research that Education experts have done. Among them can noteto the scholars, such as Goseph Abruscato, Jhonejarolimek, Barbras, and Spector and Norman G, Lederman and David w. Vanleaf.

A summary of the assumptions drawn from the works of the aforementioned authors is as follows:

- 1-Discovery requires that the learner develop a variety of skills as a process in Him.
- 2-Teachers and administrators need to do to protect the discovery from teaching students to strengthen themselves in this field.
- 3-Students of all ages are interested in the discovery, not all information in text book, it is possible to use reference books to class and put most of the students.
- 4-The content of discovery operation is "process". Discovery on teaching students the content of the process, but they are not

what lies in the content areas.

5-Students will declare the results are not conclusive, but they are "temporary testing" imagination. Students should be taught that can be changed and corrected results.

6-The discovery should not be limited to class time. Discovery is an ongoing process. So, you have created a field that will continue to flow.

7-Learners should be aware that the assessment process and the results of their own actions, in this context, teachers can also be helpful.

8-The discovery can be directly taught to students, and explain the process and skills to them.

9- Usually in discovery method, the teacher is faced with massive amounts of work. Hence the need to do a lot of patience (aghazadeh, 1999).

Thinking and discovery

Since the birth of the human infant uses its ability to detect its environment understanding and it is curious to see and learn (Kieffer, 2012). In all of the years after of birth and the school he is curious to know scientific facts how have discovered, and to find his own answers turns to thoughts and discovery. Unfortunately, this situation can not continue, because all the information is given directly to him and does not remain the question.

Scans, stressed that providing a variety of technical training in schools is not enough importance as educate and empower learners to think and resolve the issue. To foster thinking skills have to try to promote thinking. Schools should provide experiences and opportunities for thinking. Students should actively involve to thinking and reflecting, with issues, information (data), training materials and concepts (Aghazadeh, 1999). Thinking and discovery are associated, So that many researchers have suggested the assimilation process for thinking and discovery. The desired Stages of reflection and discovery, largely similar to the steps that are presented in this paper as Stages of discovery training procedure. That they are:

- 1-Understanding the problem
- 2-Collection of appropriate information
- 3-The Organize of information
- 4-Data Analysis
- 5-Establishing relationships with others and the results (Aghazadeh, 1999).

Structure of Education as discovery method

Discovery pattern is primarily a student-centered model (Huk & Ludwigs, 2009). And provide opportunities for education should be a situation where student's bewilderment and imbalance can form the basis for learning activities. Interaction of teacher and student friendly, cooperative and precise, and any comment, opinion and easily done. Although such a structure may seem a little complicated, the work of teaching and learning is highly effective and Triggers. Essentially The pattern of discovery is derived from scientific research methods, namely in this model, the students act as researchers are faced with a problem. Collects information about it, Regulate and classify information, finally get results and the results are derived from an analysis of other similar events (shabani, 2003).

Interactions in the discovery

The discovery method, unlike the models of direct instruction, the teacher's role is not to transfer and deliver course material, He plays the role of the guide in the teaching process. He replaced the direct transfer of information and scientific facts, taught the way of obtain information to students. Interaction of teacher and student friendly, cooperative and

accurate, and any opinions expressed easily occur (shabani, 2003). Versus kinds of questions that students have, the teacher interact with them only give answers "yes" or "no", "true" or "false" (aghazadeh, 1999). Phrases such as" If you pose the question that I can answer to it with say yes or no?" is a typical response of the teacher when students are out of the routine discovery (Joyce, translated by Behrangi, 1993).

Steps of Implementation discovery teaching methods

The first step: engage with the problem

In the first step, the teacher will provide the status of the issue. And explain to students the ways of discovery (specific goals and practices Question Yes - No). Of course, the ultimate goal is that the students, more senior students, are forced to create knowledge experience, to method of the scientists. However, investigators can begin with simple ideas.

The second and Three steps: Data collection - Verify and experimentation

The second phase is Verify by its students receive information about events or experiences that they have collected. Students in experimentation, which is the third step, insert the new elements into the situation to see it differently event can occur or no. Although Verify and experimentation are described as the separate stages of the model, Kinds of questions that make students think and is usually converted between these two aspects of Data collection. Tests are two functions: discovery and direct tests. Discovery or change things, to see things from their, is not necessarily guid by a theory or hypothesis, But it is possible to create a mind for theory. Prosses Convert the building a hypothesis to test is not easy and requires practice. Many questions may be necessary to focus only on a theory of verification and experimentation. Few theories can be abandoned on the basis of a test. However, it is the desire to "discard" a variable that the first test of the theory not supported, but doing this can be very misleading. One of the roles of teacher control of students when they think of a variable is negated while it is not. The second role of the teacher, expand of students discovery, by expanding the information that they get. They may ask questions during the Verify about the objects, properties, events and circumstances. Questions relating to the objects asked to identify the nature or identity of objects.

The fourth step: Organize, order an explanation

In the fourth stage, the teacher calls upon students to organize data and express them. Some students have difficulty toward the intellectual leap between understanding the information are gathered and the explanation for that. They may be able to eliminate necessary detail and explanation inadequate. Sometimes it may be create several explanations and theories based on the data. In such cases, it is always useful to ask the students to express their comments, Thereby, expand the scope of their hypotheses. Groups can provide a description of the situation in question is fully answered.

The fifth step: Analysis the Process of discovery

Finally, in the fifth step, they want the students to analyze their own notions of discovery. They may determine the most questions, a series of questions that are productive and those that were not productive, the kind of information needed to but not obtain. This step it is necessary to further inform current discovery and systematically progress.

Table 1: The pattern of teaching methods discovery

The first step: Entering to Problem	The second step: Gathering data - Verify their correctness
The third step: Data collection - experimentation	The fourth step: Organization, principle Statement for an event
The fifth step: Analysis of Process discovery	

Scientific discovery

This method is described in five stages during the course gets over, and student will meet to explore the contents and concepts and problem solving that will form the content this way. This will be achieved by providing a variety of classroom situations. Below is a case study of academic performance quoted Behrangi discovery is described for understanding the topic. Fourth grade students are enter the in the class will see a set of glass containers, bottles, bells, News, wooden boxes of various sizes (perforated). Students are playing with the objects that are scattered around the room, a few minutes. And bring their raucous voices. The teacher is watching. After a few minutes the students gradually sit in his place, one of them asks: sr. teacher:" What is here? It seems you want to start orchestra here?" "The teacher smiled and said," Yes, pretty much, in fact we are here for the next two weeks in a sound lab. The teacher walks around the room, and takes a device that made of wood and wire. And the sound makes it one of the wires. At the same time, using a spoon gives a blow to a soda bottle on her desk. "Do you notice anything about this noise?" He continues to question the bottle and wire tapping and playing. One student said, "Oh they sound alike, but they differ with each other. One of them wants to teacher that re-wires glass and the teacher would be busy again. Pretty soon all students realized that have an equal level of noise peak. The teacher explains: Your problem, caused by the differences between these sounds is described. Due to the limitations of our tools in the classroom, i want from you organiz your-self that could you provide me with a test set of principles that you think explains the sound differences. In the end, explain how we can make the Musical instrument with particular design functionality. I'll give you what you want to do it like the instrument. You will tell how to make it. Then we will review your comments. Now, we need to organize ourselves into several groups, and to determine how to begin. Does anyone have idea? Sarah says curiously: Yes, I realize that these objects are made of five different materials, Perhaps we should also be divided into five groups. And test each of them for a while. After that we've learned to share everything with each other. And the other groups examined them and decided to exchange ideas. The next step would then be set task. Other students will be entered into discussion with other offer, and class discussion about how they plan to begin study for half an hour. As you can see, providing an opportunity to the students to become active, and participate in the learning process. Each have a role and be motivated to learn and learning to be effective in all cases. If a child tries to build hypotheses about the complex relationships between all the variables immediately, May be caught in an endless tests and no significant progress. But by creating separate variables for each test alone can eliminate irrelevant variables. And Discover the relationships between the independent variables and the related (such as temperature metal blade) and the dependent variable (bending blade) (Sakman, 1962, pp. 16-15, quoted Behrangi). The students try to create theories which can explain fully what happens. For example "blade of metal that were somehow connected". They were different degrees of expansion. When the temperature was further found that the degree of expansion that causes pressure on the other two blades were bent. Even after a long and thorough examination of the facts and accuracy of verification activities, may still be available in many other descriptions and content. Hence students are encouraged not to rely on explanation that seemed appropriate to the facts. Discovery can not be done in a training program. Amplitude of useful manner in discovery is widespread. Therefore, students

should be free to organize their questions and thus bring it to the test material {Discovery Meeting}. Discovery can generally be divided into the extended term. This statement should be organized so as to reasonably. So that subjects are formed in succession based on other. This leads to false assumptions in regard to the failure or low performance or is bothered again (Sakman, 1962, pp. 16-15, quoted Behrangi).

Merits of the discovery pattern (quoting Shabani, 2003):

This model is useful for students of all ages and levels.

Strengthen the Methods and attitudes that are essential to an investigative mind.

Makes learner autonomy in learning and problem solving.

Finally, enhance the self-reliance and self-control.

Student's interest is stimulated.

This method cause that lives of students associated with school activities.

Cause that broad thinking and not rush to judgment.

Strengthen the temporary nature of attitudes and pluralism in the sciences.

Strengthen the scientific reasoning and judgment based on evidence.

Cause the logical thinking, tolerance for ambiguity and opposing ideas.

Discovery pattern constraints (quoting Shabani, 2003):

Not applicable to the situation prevailing in most classes.

Activities require more time than conventional schools.

The teachers are experienced and familiar with research needs.

Depending on the type evaluation and regulations governing in schools, it is limited in its effective implementation.

Teaching Methods in Pattern discovery

Teaching methods are varied in the discovery model.

As for exercise, and strengthen the implementation process, there is several teaching techniques in discovery Model and Many of them can be easily implemented in a school. The most important methods include:

1-The scientific trip Method

2-The experimental Method

3-The Exploratory Method

4-The Method of units (work units, experimental units and project units)

The scientific trip Method

This Method is to study the specific purpose of teaching, the teacher and student designed and regulated. The first issue that must be considered in this way, value, capacity and quality of scientific trip. If we expect good results from this procedure must be performed a design before of implementation until at obtain of educational goals, to be safer. The Method the scientific trip In terms of time is divided into 4 types:

1-The short and quick scientific trip

2-The One or two hour scientific trip

3-The Daily scientific trip

4-The Weekly and monthly scientific trip

The short and quick scientific trip

At this the scientific trip, one or two students during teaching hours are selected to gain experience outside the classroom. For example, if the question is "how many square meters school yard garden area of the rectangle?" To find answers to these questions may be responsible for some of the learners, With Devices such as a pencil, notebooks and a tape measure to find the answer actually lies at the school yard garden. Although it may be Length more than a few minutes. But it is called the scientific trip, because it is linked the classroom to a class outside.

The One or two hour scientific trip

By giving a blueprint, can be used of teaching session Minute in outside of the classroom, and conducted research on school effectiveness or around it. For example, the reading of the will equip learners to examine the flowers and plants around the school or the school yard, and prepare reports.

The Daily scientific trip

This type of trip, including topics such as visiting a showroom, factory and so on. And because it link school students with real-life environment, for they were very helpful.

The Weekly and monthly scientific trip

This type of trip usually not used in primary schools. However, middle school students, especially high school and college can do this nicely. Planning a trip can be divided into three stages:

- A) Activities before going to the trip.
- B) Activities in during field trip.
- C) Activities after the field trip (shabani, 2003).

The experimental Method

This method is based essentially on the principles of discovery learning. During the experimental procedure is an activity where students actually apply the concept of special equipment and special experience. The experimental procedure can enhance the quality of learning, and is a very motivating factor in learning activities. This method can be useful to satisfy their curiosity and strengthen the exploration and development of critical thinking and learning, and create self-confidence and satisfaction in students. The teacher's role in this way, guiding students and monitor them. Before starting the test, the teacher should observe the following test methods to improve the experimental Method:

- 1-Grouping th students based on the number and facilities;
- 2-Specify the activities and tasks of member in each group;
- 3-Explaining the correct way of testing to students Accurately and clear;
- 4-divided The laboratory equipment according to need of Each group;
- 5-emphasizes the Necessary security points to students;
- 6-Asking from students to prepare a written report of the test results. All reports should be obtained directly from the written test results; the teacher's control at all stages of the experiment, the students should not be discontinued.

The Exploratory Method

Exploratory methods are one of the most fascinating discovery methods (Schweisfurth, 2001). This method has shifted to position of teaching that in these, students with Help limited or no teacher guidance, discover the relations or generate new ideas (decheko & craford, 1988, quotes Shabani, 2003). The Exploratory Method is approach that through it students encouraged to interact with their environment, namely in Exploratory Method student discover the relationships with investigation, manipulate objects, and challenge ideas, and reach an understanding of the phenomena (amrod, 1995; quotes Shabani, 2003). This educational approach has both pros and cons. Jrom Bronner is one of the proponents of this approach, that in the explaining of his theory much emphasizes to the importance tetra learning process, make learning, the importance of intuition and inner motivations. He does not know synonymous the exploratory method with problem solving method, because in his view, The Exploratory Method requires intuitive thinking, While solving approach requires to analytical thinking. Beeg One of the other Educational experts that are agreeing with the exploratory method. Although he was criticized Bruner's view in some sense, but believes that

exploratory approach is superior of direct teaching, Beeg calls their approach theeducation for rethink and suggests that change Subject in the teaching process constantly, Give confusing results, And allow to students that make wrong, and then ask them to come to rethink and explore. In his view taught methods require more time for open discussion and reflection. From popular opposition Bronner's view can be named Skinner.

Exploratory teaching method has the steps are as follows:

The First stage) designs and selects a problematic situation or enigmatic

The Second stage) providing the enigmatic position

The third stage) information analyzes, think and explore relationships

The fourth step) reflection and analysis of process exploration

The Method of units

The Method of units is a series of activities that bypasses around a set of general concepts, and intends a general objective. All content, design is at the core of an issue and a problem, that variety of information and skills that can be mobilized to address the various aspects of it. The Method of units comes in the Method and focus on a range of issues ongoing relationship with other issues (regardless of the artificial and formal break strings). Sometimes the attention is focused on the Subject of study, in which case it is called a "Subject-based units", but sometimes, instead of the main focus to be shifted, to be focused to promote student interest and previous experience for the next experience. In this case, called the "unit-based experience"; Sometimes the main attention to be focused on the activities of the student and his inner motives and conclusions of his work. In this case it is called "project-based unit" shabani, 2003).

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