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An analytical study of developing problem solving ability among students

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Abstract
Education is the propagation of life through life. Problem solving is a student's personal measure which describes how well one can perform actions required to deal with prospective situations. In general, the state of tension is created in mind when an individual faces problems. He exercises his maximum endeavours and uses all his abilities like intelligence, thinking, imagination, observation etc to resolve that problem. Some students are able to solve problems more efficiently than others, which indicate that there are differences in their problem solving abilities. In general, the purpose of this research article is to know the enhancement of students' problem solving ability. A systematic attempt has been made to discuss various strategies for developing problem solving ability among students.

Keywords: problem solving ability, reaps model, problem solving skills

Introduction

In today's world, life is full of problems and to solve them is a staggering task which requires a convinced degree of judgment and reasoning. More complex the problem, higher the level of the thinking required. Problem solving has become a measure of intelligent behavior, as this requires thinking, imagination, observation etc. Problem solving is the framework or pattern within which creative thinking and reasoning takes place. It is the ability to think and reason on given level of complexity. People who have learnt effective problem solving techniques are able to solve problem at higher level of complexity than more intelligent people who have not received such training. Problem solving takes place as soon as the problem is perceived by the problem solver or student. Firstly, one makes adjustment to a given situation. The process of problem solving requires some new responses or the combination of old responses and reasoning that often provides the answer.

The problem solving is the process of overcoming difficulties and the highest level of learning in the hierarchy as proposed by Gagne which depends on the mastery of next lower types of learning. It involves the application of principles and facts to explain and solve new phenomena or predict consequences from known conditions. The basis of problem solving requires predictions, analysis of facts and principles to develop cause-effect relationship. The problem solving ability is the ability of an individual to solve their problem effectively. It is the ability of the person to find the solution of the problem. Problem solving ability is a mental process that includes problem finding and problem shaping. It is considered the most complex of all intellectual functions.

Problem solving has been defined as higher order cognitive process that requires modulation and control of more routine in fundamental skills. Problem solving a reflective thinking is regarded as a type of mental activity towards which all simpler learning lead to. It requires ability to reason which is the distinguishing characteristic of intellectual activity.

Problem Solving Ability

Skinner (1968) "Problem solving is the framework or pattern within which creative thinking and reasoning take place".

Gates et.al. (1973) referred "Problem solving as a form of learning in which the appropriate response must be discovered".

Woodworth and Marquis (1984), "Problem solving behavior occurs in novel or difficult situation in which situation is not obtainable by the habitual method of applying concepts and principles derived from part experiences similar situation".

The ability to problem solve and think critically are two of the most important skills that students can learn. Because students need these skills to succeed in their academics and in life in general. It allows them to find a solution to issues and complex situations that are thrown there way, even if this is the first time they are faced with the predicament. The development of an increasingly modern era as it currently requires the existence of human resources quality. One of the ways to improve the quality of human resources is education. Education conducted in India has a role to develop all the potential in students itself. One of the goals of learning should be build a student's initial knowledge, real-life experience and direct experience of the nature around related to daily life. However, the demands of curriculum is the student thinking ability. Thinking is included in the intellectual ability which is the ability that needed to execute various mental activities (thinking, reasoning and problem solving). One of the indicators of intellectual behavior is the ability to solve problem (problem solving). Thus, a student is expected to have adequate problem solving ability that will help them in solving academic and non-academic problems. In addition, with adequate problem solving ability, it will facilitate students in faced work situations filled of various problems that must be resolved by them. The ability of problem solving can strengthen students in their education, skills and personal life. The ability of problem solving in various learning

contexts is essential for develop knowledge in innovative and creative ways and gaining insight. Problem solving is one of the main tools of learning.

Heller et al (1992) [1] states that there are five stages to be scored in order to assess the problem-solving abilities. The five stages are such as

1. Focusing the problem, can be developed through the form of images or words that can help students.
2. Describe the problem into the concept, students can simplify the problem by doing by linking the problem with the concept of in terms of principles and theories.
3. Planning a problem-solving solution (student the solution), students create a framework of equations based on the relationships that have been proposed in the previous stage.
4. Implementing execute the plan, students can manipulate equations, enter known numbers and solve algebraic problems.
5. Evaluating the solution (evaluate the solution), the student must evaluate the answer and make sure that the answer is satisfactory.

Observing the importance of developing problem solving skills in learning, students are required to have these abilities accompanied by creativity in finding a solution to a problem. In the application of daily life students are required to work together or collaborate with others.

Reaps Model

In the learning activity, the teacher should also facilitate the students properly to develop the abilities. In this research article, the model that will be discussed to improve problem solving ability is the Real Engagement in Active Problem Solving (REAPS) model. The Real Engagement in Active Problem Solving (REAPS) Learning Model is a model developed in the USA. This model has been applied in elementary, junior and senior high school. The development of the REAPS model began in 2004 when Maker, Zimmerman and Schiever, in collaboration with doctoral students from Turkey, Saudi Arabia, Taiwan, Russia, and Egypt. They used three models together in a professional development project for teachers who were gifted in mathematics and Science from Korea. The learning of this model is student-centered, through the incorporation of different problem-solving strategies. The REAPS model is a model that combines several models including Discovering Intellectual Strengths and Capabilities (DISCOVER), Thinking Actively in a Social Context (TASC) and Problem-Based Learning (PBL) to assist students in their learning process while they engage in meaningful real-life issues and science solving activities.

In implementing the REAPS model planning is required based on guidelines that have been made. According to Maker et al (2016) [4], the REAPS model implementation guidelines are as follows: The first important factor is to identify the concept to be taught. Determine how to collect information about students' prior knowledge of concepts that would be developed during the learning process. The way to be conduct in this research is to do pretest before giving treatment of learning with REAPS model. Identify real life problems that students will solve Conduct case studies about this issue. Identify content of areas and general information about students, identify activities that would be undertake to organize students and learn the content from concepts, and developed the solutions for selected issues. Create a chronological learning activity format and identified the component models (PBL, TASC, Discover) for each activity. For example, if you want students to explain certain phenomena thoroughly, the three REAPS components will be organized as follows:

a. **Discover:** Problem type + type of intelligence (e.g. artistic, linguistic and oral);
b. **TASC:** Students identified the main components and definitions of phenomenon; and
c. **PBLs:** identified problems that contribute toward a particular phenomenon.

After all activities have been sequenced, structured and followed the REAPS pattern, next step is preparing the resources needed for each activity, including fieldwork, visiting class by experts, and group projects. Based on this, the teacher can improve students' problem solving abilities by Real Engagement in Active Problem Solving (REAPS) learning model. These are essential skills that are also difficult to master. So we can teach our students to solve problems and think critically. In this research article, in addition to REAPS model, different strategies and methods have been discussed to teach students the problem solving ability

1. **Direct Analogy Method:** A method of problem-solving in which a problem is compared to similar problems in nature or other settings, providing solutions that could potentially be applied.
2. **Attribute Listing:** A technique used to encourage creative thinking in which the parts of a subject, problem, or task are listed, and then ways to change those component parts are examined.
3. **Attribute Modifying:** A technique used to encourage creative thinking in which the parts of a subject, problem, or task are listed, and then options for changing or improving each part are considered.
4. **Attribute Transferring:** A technique used to encourage creative thinking in which the parts of a subject, problem or task listed and then the problem solver uses analogies to other contexts to generate and consider potential solutions.
5. **Morphological Synthesis:** A technique used to encourage creative problem solving which extends on attribute transferring. A matrix is created, listing concrete attributes along the x-axis, and the ideas from a second attribute along with the y-axis, yielding a long list of idea combinations.
6. **SCAMPER:** SCAMPER stands for Substitute, Combine, Adapt, Modify-Magnify-Minify, Put to other uses, and Reverse or Rearrange. It is an idea checklist for solving design problems.
7. **Direct Analogy:** A problem-solving technique in which an individual is asked to consider the ways problems of this type are solved in nature.
8. **Personal Analogy:** A problem-solving technique in which an individual is challenged to become part of the problem to view it from a new perspective and identify possible solutions.
9. **Fantasy Analogy:** A problem-solving process in which participants are asked to consider outlandish, fantastic or bizarre solutions which may lead to original and ground-breaking ideas.
10. **Symbolic Analogy:** A problem-solving technique in

which participants are challenged to generate a two-word phrase related to the design problem being considered and that appears self-contradictory. The process of brainstorming this phrase can stimulate design ideas.

11. **Implementation Charting:** An activity in which problem solvers are asked to identify the next steps to implement their creative ideas. This step follows the idea generation stage and the narrowing of ideas to one or more feasible solutions. The process helps participants to view implementation as a viable next step.
12. **Thinking Skills:** Skills aimed at aiding students to be critical, logical, and evaluative thinkers. They include analysis, comparison, classification, synthesis, generalization, discrimination, inference, planning, predicting, and identifying cause-effect relationships.

Conclusion

Problem solving ability is needed by the students to face global competition, thus, students will be ready to plunge and participate in the world of work. Therefore, various efforts need to be conducted to improve problem solving ability in students. These efforts include improving students' ability related to their problem solving ability and improving the quality of teaching by repairing the methods and characteristics of teachers. Thus, it is expected that students will become more prepared if faced some problems, especially if they have been directly involved in the community. In an effort to solve the problems encountered, an individual will do the steps associated with the problem solving process. The ability of problem solving is a complex problem solving skill that characterizes one of the most intelligent human activities. This is because in solving the problem an individual must be able to manage the information obtained. The ability of problem solving could be said very important for students because this ability will be used by students' in the future in daily life. On the other hand, to achieve a real problem solving, students will gain new ability. This allows students to acquire a new complex rule rather than the rules used in the composite. In general, the purpose of this research paper has been achieved by knowing the enhancement of students' problem solving ability with REAPS Model and other problem solving strategies

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