PROBLEM SOLVING: REVIEW OF THEORIES AND MODELS

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Abstract

Facing a problem imposes stress and anxiety on the individual, which in turn generates a strong drives in the individual to seek problem solving. There are various theoretical approaches for problem solving depending on the relationship of the approach to the process of learning. This paper shows some of the theoretical approaches that attempt to understand the process of problem solving.

Keywords: Problem Solving, Theory.

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Introduction

The problem can be defined as: "The potential to improve". Many people thing that problem solving is equivalent getting rid of these problems in such a way that the problem existence is eliminated. Of course such view is not reasonable. Many of the problems cannot be eliminated, for example, the complete removal of dust and disease is not realistic. Problem solving signifies the processes that can help diminish and/or cope with the problem. Problem solving can also be viewed as the attempt to score in a situation, where the achieving such goal is not possible (Haris, 2002).

Theoretical Approaches for Problem Solving:

.The Behaviorist Approach

This approach describes the tendency of individuals to apply problem solving techniques by using previous experiences which the individual observed from his/her community or surrounding environment. For example, the student raises his/her hand in response to the teacher asking a question in which the student know its answer. On the other hand, the student feels anxiety when the teacher asks him/her to go to the principal's office. Such behaviors are examples of mental, emotional, and physical responses to stimuli. What do we learn? The behavior psychologists' response to this question is that we build on previous knowledge and observations (Sharkawy, 1998).

The behaviorist approach for problem solving is based on the premise that the individual learns problem solving by trial and error, and that learning problem solving is a continuous, repetitive process. The trials and repetitions of the problem solving strengthen the connections between the stimulus and the response, and thus increases the abilities and readiness of the individual on embarking on problem solving. The first trial(s) are usually characterized by being random, but as the individual experiment with the problem, the trial(s) become deliberate and focused (Al-Zayyat, 1996).

According to the behaviorist approach, when an individual faces a problem, he/she recalls suitable methodologies from his/her past experiences. The individual tries to connect between the past experiences and the current problem, or he/she tries to find common and similar

factors/elements between the past and current experiences. Upon the failure of using past experiences for solving the current problem, the individual then turns to employing trial and error, in which he/she tries to find a suitable solution from his/her behavioral configuration (Abd-Alhamid, 1999).

The behaviorist approach implies that the individual seeking problem solving is faced with a complex combination of stimuli and responses based on previous experiences. The strategies employed in problem solving in the behaviorist approach is thus comprised of different aptitudes, which varies with regards to strength and order of usage. The behaviorist approach thus constructs the aptitudes in a pyramid, which reflects the arrangement of the aptitudes from the simplest to the most complex. Therefore, the individual gradually moves upward in the behaviorist amplitude pyramid examining the simple to complex methodologies until he/she reaches a suitable and satisfying solution (Nashwaty, 1998).

Brightman (1990) considered that the reasoning of utilizing past experiences as the bases for problem solving is a contradiction to the ability of the individual to reach a new, novel solution. Such novel solutions does not originate from the collection of past behavioral approaches. Therefore, the behaviorist approach may not be suitable for abstract, complex problems, as it is necessary to approach the complex problem with new methodologies (Brightman, 1990).

2. The Cognitive Approach

This approach is also referred to as the connections between the stimuli. The learning process is the tendency of the individual to expect consecutive events upon the occurrence of a stimulus in a certain situation. For example, when the driver stops at a red light, it is not because the driver learned to stop inevitably when seeing a red light. The driver actually learned the meaning of the red light, which he learned that it is connected to the possibility of getting into an accident, or being stopped for running a red light by a policeman. Therefore, the knowledge about the consequences of running a red light helps the driver in deciding how to response to the red light. To answer the question of what do we learn? The cognitive approach response is that we learn this knowledge (Sharkawy, 1998).

The cognitive approach defines the problem as an imbalance in the cognitive domain, which needs to be repaired by reconstruction or restructuring of the knowledge. In repairing the cognitive domain, a modified system is established by which it creates a balance and organization. The cognitive approach encourages fruitful thinking as means to acquire vision to possible routes for problem solving. This is because the problem solver needs to attain a holistic understanding of the situation/problem before he/she can dissect and scrutinize the details of the situation/problem (Jamal, 2001).

Envisioning of a solution is not always a learning process by which the learner compile information that enable him/her to suddenly achieve a desired solution. Envisioning a solution is a gradual learning process by which the learner comprehend the connections and relationships within a situation/problem. Here, the learner reorganizes the information into new units to achieve a desired solution. Therefore, in attempting to problem solving, it is necessary to have a holistic view of the problem to assess all the components of the problem and their interrelationships. To refrain from dealing with the problem holistically results in inability to understand the realistic dimension of the problem, and thus, inability to achieve a reasonable solution. This is similar to looking at an object from one angle, which will not enable the viewer from truly acquiring the true configuration of the object (Abo Jado, 2000).

There are four different types of envisioning solutions to the problems (Brightman, 1990):

1) The impulsive solution: Here the individual eagerly attempt to embark on a solution, but then eagerness ceases. The individual then go through a confusion state, but suddenly figures out a desired solution.

2) The gradual solution: Here the individual makes many unfocused, uneducated attempts to reach a solution.

3) The stable solution: Here the individual attempt a solution by using several steps/stages to embark on the problem. The steps/stages are characterized by being focused and structured in such a way that the individual is fully aware of the logical sequence of steps/stages and their interrelationships. Moreover, the steps/stages leads the individual to construct several hypothesis, which he/she then narrows down throughout the progress of developing a solution.

4) The direct solution: Here the solution is achieved without the development of steps/stages.

janeeh (1965) argues that there are eight different modes of learnin: 1) learning principles; 2) learning concepts; 3) differentiation learning; 4) verbal learning; 5) learning consecutive movement; 6) learning sign/body language; 7) stimuli learning; 8) response learning. The learning modes can be organized in a pyramid in ascending order of their complexity. Nested within the first level is the motor-physical learning, and nested in the eight level is the learning of problem solving. Thus the learning problem solving is dependent on the competency of the lower seven levels of learning, and the ability to find connections and interrelationships between the different concepts and strategies embedded in the lower levels of learning (Abd-Alhamid, 1999). The learning model of janeeh points to the importance of learning adequate principles and concepts, and their application of problem solving. It is imperative to acquire such principles and concepts as it allows the learner to interconnect between the principles and concepts. These interconnections then allow the learner to assimilate different components of their knowledge to find a solution. Therefore, problem solving is not only dependent on acquiring the principles and concepts, but it is also dependent on reconstructing the principles and concepts to achieve a higher level of learning. As such, problem solving is considered a higher level of cognitive ability than that of acquiring knowledge (Odeh, 1996). Figure 2.5 illustrates janneh'sdifferent modes of learning.

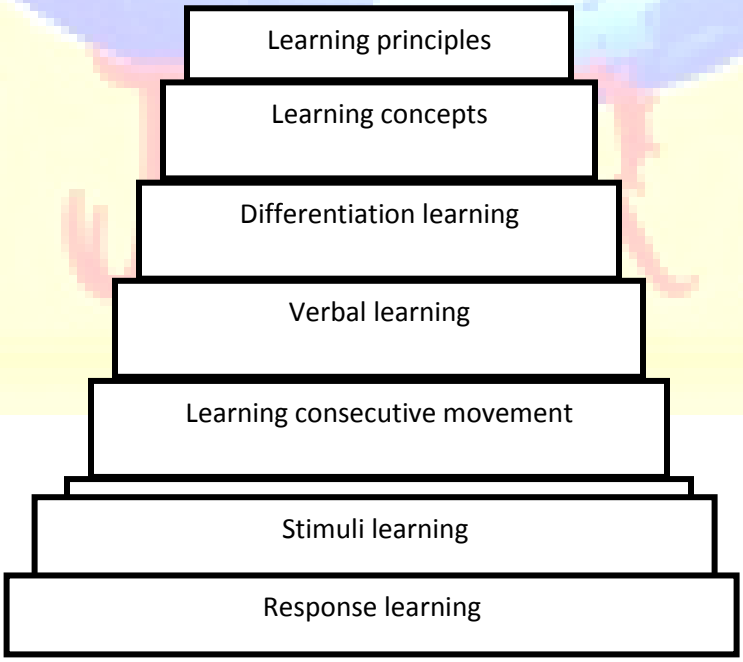

Figure 1 :janneh'sdifferent modes of learning

Guilford (1996) introduced model for problem solving that is based on his theory of Structure of Intellect. Guilford called the model "Structure of Intellect for Problem Solving". The first stage in this model is the nervous system receiving a stimulus from the environment. The stimulus could also be emotional. The stimuli is then filtered in a net-like tissue in the lower brain. The net-like tissue acts like a gate that controls the entrance of the stimuli to upper parts of the brain, where knowledge and understanding is located (Guilford, 1986).

The stimuli that is allowed to pass from the net-like tissue in the lower brain results in alerting the individual to the presence of a problem. The individual is then prompted by the nervous system to comprehend the problem. It is at this stage that the individual starts searching in his/her stored knowledge in the upper brain for plausible solution. If the individual does not find a solution, then he/she reverts to outside help and/or stars searching for new facts and information that could help in solving the problem. During the quest for new facts and information, the individual constantly scrutinize and evaluate the new information. At certain instances, the individual can reach a solution without using the divergent thinking, which entails the person to find more than one probable solution. This means that the individual is able to directly employ the convergent thinking, which entails finding a unique solution, as soon as he/she senses the problem, and after the acceptance of his/her memory to respond to the stimuli. Figure 2.6 illustrates Guilford's Structure of Intellect for Problem Solving.

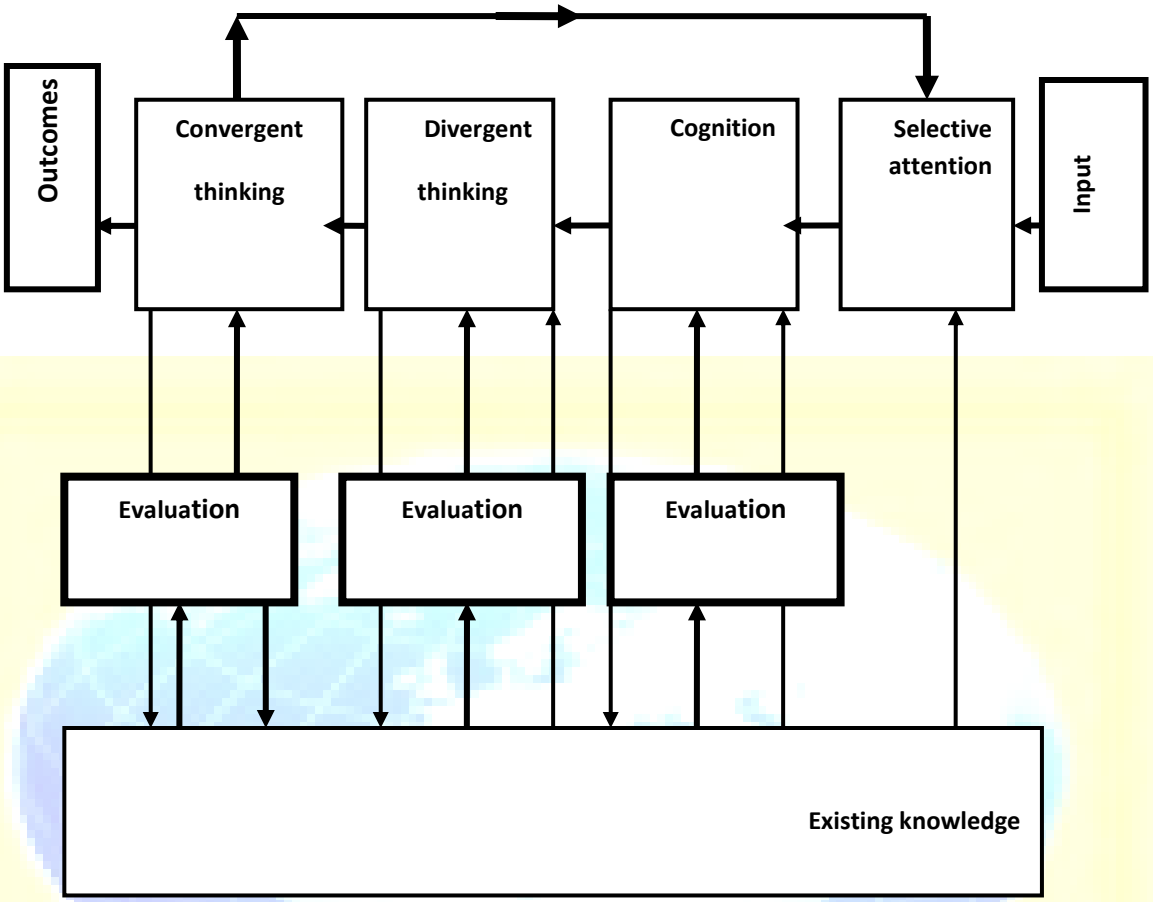

Figure 2: Guilford's Structure of Intellect for Problem Solving

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