CHAPTER II

CONCEPTUAL FRAMEWORK

2.1 INSTRUCTIONAL STRATEGIES

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CONCEPTUAL FRAMEWORK

Theories and statements explain a particular segment of phenomena by specifying certain relationship among variables. A theory is a set of interrelated constructs, definitions and propositions that present a systematic view of phenomena by specifying relations among variables with the purpose of explaining and predicting the phenomena. The word theory having two central meanings can be referred to as a hypothesis or set of hypothesis. Education is vital to the pace of the social, political and economic development of any nation, so effective teaching is very essential.

Since the present study was indented to develop an Instructional Strategy based on Path-Smoothing Model on Creative Problem Solving Ability, Perceptual Speed and Achievement in Mathematics of students at Secondary level, a detailed understanding of concepts related to Instructional Strategy, Path-Smoothing Model, Creative Problem Solving Ability, Perceptual Speed and Achievement in Mathematics is necessary.

2.1 INSTRUCTIONAL STRATEGIES

An Instructional Strategy is a process or manner by which an instruction phase, or an entire course is delivered, and which may include a conference, demonstration, discussion, lecture etc. It is also called technique of delivery.

Instructional Strategies include all approaches that a teacher may take to engage students in the learning process actively. These strategies drive a teacher's instruction as they work to meet specific learning objectives and ensure that their students are equipped with the tools they need to be successful. Effective Instructional Strategies meet all learning styles and the developmental needs of all learners. Teachers must be equipped with a well-
rounded arsenal of effective Instructional Strategies to maximize their effectiveness and to increase student learning opportunities.

Instructional Strategies are the techniques or methods that a teacher can adopt to meet the various learning objectives. These strategies help students to become independent and strategic learners. They equip teachers to make learning fun and help students to awaken their desire to learn. Instructional Strategies focus on not only the educational content but also on the method and environment of the teaching process. Students’ development level, interests and experiences are considered while choosing a particular Teaching Strategy, so that they can self-accomplish their goals. A number of Instructional Strategies to realize different instructional goals have been developed by different researchers. The works done by Bruce Joyce and Marsha Weil (1996) is a monumental in this area.

**Models of Teaching**

Models of Teaching are not only indented to accomplish a range of curricular goals but it is also designed to help the students to increase their power as learners. According to Joyce and Weil (1996), A model of teaching is a plan or pattern that can be used to shape curricula, to design instructional materials and to guide instructions in the classroom settings. Models of Teaching are in fact models of learning. As teachers help students to acquire information, ideas, skills, values, way of thinking and means of expressing themselves, they also teach them how to learn. Models of Teaching are designed for specific purpose, such as the teaching of information concepts, ways of thinking, the study of social values and so on by asking the students to engage in particular cognitive and social tasks.

Models of Teaching were designed to impart to learners such strategies, which will help learners to think clearly and wisely and build social skills and commitment. They help students to acquire information, ideas, skills, values,
and ways of thinking and means of expressing themselves in a nutshell. They are taught how to learn (Eggen, Kauchak and Harder, 1979). Models of Teaching include many but not all of the major philosophical and psychological orientations towards teaching and learning. Each of them has coherent theoretical bases (Joyce and Weil, 1996).

The models approach to teaching was first described by Joyce and Weil (1996), who defined a model as “A pattern or plan which can be used to shape a curriculum or course to select Instructional material and to guide teachers action. Eggen et al. (1979) defines Models as prescriptive teaching strategies designed to accomplish particular Instructional goals. Model differs from general teaching strategies because of this principle. General approaches to teaching are considered to be applicable to all teaching situations. But these Models of Teaching are not cure-alls or applicable to all teaching situations. Dececco (1968), making a distinction between teaching models and a theory of teaching says that, models do not have the rigor of tested theories. Some useful models may eventually give way to empirically tested theories. Models of Teaching is a tool to help good teachers teach more effectively by making their teaching more systematic, But they are not substitute for teaching skills. They are rather complementary (Eggen, Kauchak and Harder, 1979). A model of teaching consists of guidelines for designing educational activities and environment. It specifies ways of teaching and learning that are intended to achieve certain kinds of goals. The use of models requires an ability to identify different types of Instructional goals so that specific model can be selected to match a particular goal.

The Teaching Model is a good tool of teaching in which components are interrelated and arranged in a sequence whereas method is made of accomplishing an end. It is concerned with teaching techniques of implementing model. Effective teaching is important because teaching is based on helping children progress from one level to another in a more sociable
interactive environment and to make students’ an independent learner. Effectiveness does not mean being perfect or giving a wonderful performance, but bringing out the best in students.

For make teaching effective, a good method must be adopted by a teacher. A teacher has many options when choosing a style for teaching. The teacher may write lesson plans, or search online or within books to make teaching better and informative. When deciding what teaching method to use, a teacher needs to consider students' background, knowledge, environment, and learning goals. Teachers are aware that students learn in different ways, but almost all children will respond well to praise. Students learn in different ways, of absorbing information and of demonstrating their knowledge. Teachers often use techniques which cater to multiple learning styles to help students retain information and strengthen understanding. A variety of strategies and methods are used to ensure that all students have equal opportunities to learn. A lesson plan may be carried out in several ways: questioning, explaining, modeling, collaborating, and demonstrating.

Traditional method of teaching is that a teacher directs students to learn through memorisation and recitation techniques thereby not developing their Critical Thinking, Problem Solving and Decision Making Skills, while modern or constructivist approach to teaching involves a more interacting, student-based teaching. Here, the students learn through group participation.

2.2 THE PATH-SMOOTHING MODEL

Wigley (1992) in his article entitled ‘Models of Teaching Mathematics’ in which he described the Path-Smoothing Model. He mentions how teachers who use this model to exercise professional care for their pupils and help them achieve success in public examinations.
This model emphasizes repetitive rather than insightful activities, almost all teachers who use it as their basic approach will also consciously offer some insightful experiences. They will, for example, attempt plausible explanations, or encourage pupils to gather data about particular cases before offering a generalization. However, there is usually a pressure of time felt by teachers, and consequently by their pupils, to move on to the 'work', which is perceived as doing exercises. The teacher may find the time to offer explanations but not to provoke the debate needed to clarify meanings. Inevitably, pupils' perceptions remain unexamined if they passively agree to the arguments in order that work can proceed. So attempts to justify and explain, although genuine in intent, can fail to convey understanding to the pupils.

The main features of the model, the essential methodology of which is to smooth the path for the learner:

1. **The teacher or text states the kind of problem on which the class will be working:**

   The teacher or text attempts to classify the Subject matter into a limited number of categories and to present them one at a time. There is an implicit assumption that, from the exposition, pupils will recognize and identify with the nature of the problem being posed.

2. **Pupils are led through a method for tackling the problems:**

   The key principle is to establish secure pathways for the pupils. Thus it is important to present ways of solving problems in a series of steps which is as short as possible, and often only one approach is considered seriously. Questions asked by the teacher to pupils usually lead them in a particular direction.
3. **Pupils work on exercises to practice the methods given aimed at involving learners more actively:**

   These are usually classified by the teacher or text writer and are graded for difficulty. Pupils repeat the taught processes until they can do so with the minimum of error.

4. **Revision:**

   Longer term failure is dealt with by returning to the same or similar subject matter throughout the course.

   In most textbook schemes, this model is perpetuated. Individualized schemes almost inevitably follow the model, because they are dependent on the pupil being able to take small manageable steps, without constantly referring to others. So does any approach which basically uses a sequence of pre-structured questions and does not give pupils the space to explore their own responses to situations or to participate in making significant choices for themselves. Teachers who hold this model of teaching and learning certainly exercise professional care for their pupils and help them to achieve an important measure of success in public examinations. This care is shown in a variety of ways: by providing a structured framework with a clear work pattern, by marking the pupil's work on a regular basis and explaining where the pupil has gone wrong, by being available to sort out difficulties as they arise. As to public examinations, these tend to fall into a set pattern over the years and are therefore often amenable to a Path-Smoothing Model. The model is also one which, parents and the public can recognize as a popular one of which how learning takes place.
2.3 CREATIVE PROBLEM SOLVING

Creative Problem Solving is a technique to approach a problem or address a challenge in an imaginative way. Creative Problem Solving differs from routine problem solving. Routine problem solving is a pre-established method for solving the problem while in Creative Problem Solving; any pre-established method for solving the problem is either unknown or not used. Creative Problem Solving involves a hunt for new solutions, while routine problem solving uses old solutions.

Concept of Creativity

Creativity involves adaptability and flexibility of thought. It is a human mental phenomenon based around the deployment of mental skills and conceptual tools which in turn originate and develop innovation, inspiration or insight. Creativity is the ability to generate novel and useful ideas and solutions to everyday problems and challenges. Creative thought can be divided into two types of reasoning. Divergent thinking and convergent thinking. Divergent thinking is essential to the novelty of creative products where as convergent thinking is fundamental to the appropriateness.

Creativity consists of its primary and secondary phase, which includes its expressional dimensions also. Thus such concepts of creativity can be more meaningfully interpreted applying its both dimensions, the primary as well as the secondary; the original as well as the applied or expressional one.

In essence, the three dimensional model of creativity should contain 3 phases namely

i. The Primary Phase: The creative ideas that are thought to be original, unique, imaginative, novel etc.
ii. The Secondary Phase: The creative ideas that can be transformed its applied aspect of being feasible in terms of expression or formulation in an external media namely mathematical formula, common language tape recording blue prints programmed instruction etc.

iii. The Tertiary phase: Creative ideas inductively utilitarian value of being social useful, having acquired, social acceptability and social recognition through social linkage.

The structural variations accounting for functional flexibility yield the textural enrichment in creativity

Creative Ability is the direct measurement of creativeness by testing an individual with various established tests. Creative children are constantly probing, discovering, imagining, fantasying, asking questions, guessing and wondering. Therefore they should be encouraged to ask unusual questions, to explore new ways of thinking, to try novel approaches to problem, to play with ideas and material and use divergent ways of dealing with traditional topics.

Theories related to Creativity

There are five major theories of creativity each with its own unique viewpoint on what creates creativity in people. These theories are Psychoanalytical, Mental illness, Psychoticism, Addiction and Humanistic. The main focus of these theories is the “Person”. Although to some extent they may branch out into Place (trying to understand the environment that creates these creative people) and to a lesser extent Process.
Concept of Problem Solving

Problem Solving is the framework or pattern within which creative thinking and reasoning takes place. The state of tension created by unsatisfied wants drives the individuals to exercise the greatest effort and to use his best language techniques, observation, prediction and inference to control the difficulties that hinder progress towards his goals of want satisfaction. Successful problem solving and useful living are identical. Problem solving should not be considered as another topic in an already crowded arithmetic programme. Instead problem solving ought to be inherent in the development of each topic in Arithmetic.

Problem Solving Ability

Solving problems is a complex cognitive skill that characterises one of the most intelligent human activities. From childhood onwards; we actively solve problems presented to us by the world. We acquire information about the world, and organize this information into structures of knowledge about objects, events, people and ourselves that are stored in our memories. These structures of knowledge comprise bodies of understanding, mental models, convictions and beliefs that influence how we relate our experiences together, and how we solve the problems that confront us in everyday life, in school, in our jobs, and at play. Two important factors that influence problem solving are the nature of the task and the kind of knowledge brought to the problem by the solver. A problem is a situation in which we are trying, to reach some goal, and must find a means for getting there. The process of finding a solution to a problem can be visualized as a search through the paths in the problem space until one that leads to the goal is found.
Difficulties in Problem Solving

Several reasons for difficulty in solving arithmetic problems have been identified. These include 1) reading difficulties, 2) poor skill in computation, 3) inability to relate arithmetic concepts to elements of problems. Most other difficulties will be refinements of these three. Comprehension in reading is necessary in problem solving. Arithmetic problems are likely to contain special words or terms which must be understood, if the problems are to be solved.

Creative Approaches in Problem Solving

An approach is simply the way you move toward, advance, or come closer to something. There are at least two different kinds of approaches to making change happen; creative and non-creative. A creative approach implies an attempt to advance toward an outcome that is new, unstructured, and open ended. These situations often involve an ill-structured problem and unknown solutions. Although we need to use the knowledge and skills for evaluation, a creative approach requires to engage imagination, as well as intelligence, during the approach because no ready-made answer exists. It also requires more comprehensive view and use the entire system of people, method, content, and context in the approach. Creative approach gives courageous attitude, new experiences, embracing ambiguity, and venturing into new and unfamiliar territory.

Concept of Creative Problem Solving

Creative Problem Solving is a proven method for approaching a problem or a challenge in an imaginative and innovative way. It is a tool that helps people to redefine the problems they face, come up with breakthrough ideas and then take action on these new ideas. Creative Problem Solving is the mental process of creating a solution to the problem. It is a special form of Problem Solving in which the solution is independently created rather than
learned with assistance. Creative Problem Solving always involves Creativity. However, creativity often does not involve Creative Problem Solving especially in fields such as music, poetry, and art. Creativity requires newness. Creative problem solving (CPS) is a way of using the creativity to develop new ideas and solutions to problems. The process is based on separating divergent and convergent thinking styles.

**Core Principles of Creative Problem Solving**

Creative Problem Solving has four core principles:

- **Divergent and convergent thinking must be balanced.** The key to creativity is learning how to identify and balance divergent and convergent thinking (done separately), and knowing when to practice each one.

- **Ask problems as questions.** When we rephrase problems and challenges as open-ended questions with multiple possibilities, it's easier to come up with solutions. Asking these types of questions generates lots of rich information, while asking closed questions tends to elicit short answers, such as confirmations or disagreements. Problem statements tend to generate limited responses or none at all.

- **Defer or suspend judgment.** As Alex Osborn learned from his work on brainstorming, judging solutions early on tends to shut down idea generation. Instead, there's an appropriate and necessary time to judge ideas during the convergence stage.

- **Focus on "Yes, and," rather than "No, but."** Language matters when you're generating information and ideas. "Yes, and" encourages people to expand their thoughts, which is necessary during certain stages of
CPS. Using the word "but" – preceded by "yes" or "no" – ends conversation, and often negates what's come before it.

**Creative Problem Solving Learner's Model**

This model involves a step-by-step procedure includes Clarify, Ideate, Develop and Implement. **Clarify** involves Explore the Vision, Gather Data, Formulate Questions; **Ideate** involves Explore Ideas and giving Tips; Formulate Solutions come under **Develop** and **Implement** by Formulate a plan and Giving Tips.

![Diagram of Creative Problem Solving Learner's Model](Image)

*Fig 2.1: Creative Problem Solving: Learner's Model*

Creative Problem Solving Ability involves Opportunity Finding, Data Finding, Problem Finding, Idea Finding, Solution Finding and Acceptance Finding. This comes like a cycle. This is as shown in the figure given below.
Fig. 2.2 Steps in Creative Problem Solving

Process of Creative Problem Solving

Creative Problem Solving is a structured process, it is also a very flexible one. It is also cyclical, step by step process. When Creative Problem Solving becomes part of our own way of thinking and working, we can use one step at a time, as we need it, when we need it. Once we understand the fundamentals of Creative Problem Solving, we can adapt this process to every situation we encounter, thereby realizing its power.
**Fig 2.3** Process of Creative Problem Solving

**Table 2.1**

*Process of Creative Problem Solving*

**Objective Finding** - *Identify Goal, Wish or Challenge*

This could be a wish or a goal. It might be the initial dissatisfaction or a desire that opens the door to using the Creative Problem Solving process.
Fact Finding - Gather Data

Assess and review all the data that pertains to the situation at hand. Who’s involved, what’s involved, when, where, and why it’s important. Make a list of the facts and information, as well as the more visceral hunches, feelings, perceptions, assumptions and gossip around the situation. In this step, all the data is taken into consideration to review the objective and begin to innovate.

Problem Finding - Clarify the Problem

In this step, explore the facts and data to find all the problems and challenges inherent in the situation, and all the opportunities they represent. This is about making sure you’re focusing on the right problem. It is possible to come up with the right answer to the wrong problem. Re-define what you want or what’s stopping you.

Idea Finding - Generate Ideas

Generating ideas is much more than brainstorming. During this step, be vigilant about deferring judgment and coming up with wild, outrageous, out-of-the-box ideas. This is where you explore ideas that are possible solutions and have the most fun. It’s also where you need to stretch to make connections, take risks, and try new combinations to find potentially innovative
solutions.

**Solution Finding – Select and Strengthen Solutions**

First, try to strengthen and improve the best ideas generated. Next, generate the criterion that needs to be considered to evaluate the ideas for success. Apply that criteria to the top ideas and decide which are most likely to solve the redefined problem. The best idea needs to meet criteria that make it actionable before it becomes the solution. A creative idea is not really useful if it won’t be implemented.

**Acceptance Finding – Plan for Action**

In this step, look at who’s responsible, what has to be done by when, and what resources are available in order to realize this idea as a full-fledged, activated solution.

**Uses for Creative Problem Solving Skills**

Creative problem solving skills have countless uses. Too often people associate Creative Problem Solving with dealing with crises or difficulties, or think of it as something that's used for games and puzzles or special kinds of jobs. However, Creative Problem Solving skills are required for achieving exceptional performance in most jobs (and all the good jobs). The term "Problem" simply refers to any discrepancy between the current situation and a desired future situation. So, finding a way to exploit an opportunity is a form of problem solving just as coping with a crisis is. Moreover, any opportunity to improve work processes or products fits that definition of a problem. Creative thinking is not just for certain jobs, like writing advertising copy or designing
entertaining training programs. Creativity can help all of us progress from our current situation to a desired future situation, whether our jobs are normally thought of as involving "Creative work" or not.

The Creative Problem Solving process differs from routine problem solving in that with routine problem solving a pre-established method for solving the problem is used; with creative problems solving, any pre-established method for solving the problem is either unknown or not used. Creative problem solving involves a hunt for new solutions, while routine problem solving uses old solutions.

**Conceptual Blocks**

Despite the importance of creative thinking to so many facets of our lives, human beings are prone to mental ruts. Our brains are powerful Computers with the capacity to be very flexible, but sometimes our thought processes aren't as flexible as they need to be. A number of conceptual blocks can keep us from solving problems creatively. Some of the Conceptual blocks are:

**Constancy** : Once we've learned a solution to a problem, we often try to reuse that solution when encountering similar problems. It can be difficult to ignore that solution and consider others. When that solution is ineffective, being fixated on it interferes with our problem solving. Creative problem solving requires being able to define and solve problems multiple ways.

**Commitment** : Although our minds can process a lot of information, we often get committed to overly simplistic assumptions about things. For instance, we assume that our current project is like prior projects, or we assume that our customers have similar priorities. In other words, we stereotype things. Creative problem solving requires relaxing our assumptions in order to notice subtle differences and similarities that might help us find solutions.

**Compression** : To quickly solve a problem, we often artificially limit the
information we use in defining the problem and searching for solutions. We overlook important things surrounding the problem or mistakenly assume that some types of solutions are more appropriate than others. Creative problems solving requires looking at the "big picture," considering all relevant information about the problem, and ensuring that a variety of possible solutions are examined.

**Complacency:** Sometimes we give up too easily when we encounter problems for which we don't immediately see solutions. The Wright brothers could have easily given up on their early attempts at flight and many people thought they should, but they didn't. Instead, the Wright brothers put a tremendous amount of time and energy into study and experimentation. Creative problem solving often requires extensive study of the problem and time for creative ideas to incubate in our minds.

Our minds tend to be programmed to quickly solve the problems we typically encounter in a day. However, those thought patterns could block our ability to solve problems creatively. To increase our creativity, we need to break our conceptual blocks.

**Overcoming Conceptual Blocks**

There are many things we can do to overcome our conceptual blocks and enhance our creative problem solving skills. Individually, we can practice creative problem solving and keep our minds flexible by playing with lateral thinking puzzles. There are several books on lateral thinking puzzles in most bookstores.

When facing a particular problem that you would like to solve creatively, there are a number of techniques you can use to overcome conceptual blocks. (1) First, reduce any stress that you might be experiencing and try to put yourself in a positive mood. Problem solving under stress tends not to be very creative. (2) Second, accept and be patient with wild ideas.
Generating and considering wild ideas can seem like a waste of time, but it's often the route to an ingenious solution. (3) Third, play around with the problem definition. State the problem as you see it and then try to see it in other ways. Use odd analogies for the problem. Elaborate on it, and look for ways to state it "the other way around." These activities break the "compression" conceptual block. (4) Fourth, produce many possible solutions without regard to their practicality. After listing many solutions, try combining and modifying the solutions on the list. There are several techniques such as training focus on fluency, excursion techniques, pattern breaker techniques, synetics, shake-up exercises, to enhance Creative Problem Solving Ability.

Steps in Creative Problem Solving
1. Clarify and Identify the Problem
2. Research the Problem
3. Formulate Creative Challenges
4. Generate ideas
5. Combine and evaluate the ideas
6. Draw up an action plan
7. Do it (implement the ideas)

1. Clarify and identify the problem

First and most important step of Creative Problem Solving is identifying the real problem or goal. This may seem easy, but very often, what we believe to be the problem is not the real problem or goal. For instance, you may feel you need a new job. However, if you break down your problem and analyse what you are really looking for, it may transpire that the actual issue is that your income does not cover your costs of living. In this case, the solution may be a new job, but it might also be to re-arrange your expenses or to seek a pay rise from your existing employer.
2. Research the Problem

The next step in Creative Problem Solving is to research the problem in order to get a better understanding of it. Depending on the nature of the problem, you may need to do a great deal of research or very little. The best place to start these days is with your favourite search engine. But do not neglect good old fashioned sources of information and opinion. Libraries are fantastic for in-depth information that is easier to read than computer screens. Friends, colleagues and family can also provide thoughts on many issues. Flora on sites like LinkedIn and elsewhere are ideal for asking questions. There’s nothing an expert enjoys more than imparting her knowledge. Take advantage of that. But always try to get feedback from several people to ensure you get well-rounded information.

3. Formulate one or more Creative Challenges

The next step is to turn these issues behind the problems or goals into creative challenges. A creative challenge is basically a simple question framed to encourage suggestions or ideas. Creative challenges should be simple, concise and focus on a single issue. Creative challenges should not include evaluation criteria. Putting criteria in the challenge, we will limit creative thinking and after generating ideas, and use the criteria to identify the ideas with the greatest potential.

4. Generate ideas

Finally, we come to the part most people associate with brainstorming and creative problem solving: idea generation. And you probably know how this works. Take only one creative challenge. Give yourself some quiet time and try to generate at least 50 ideas that may or may not solve the challenge. We can generate ideas alone or we can invite some friends or family members for help.
5. **Combine and evaluate ideas**

After writing down all of ideas, take a break. It might just be an hour. It might be a day or more. Then go through the ideas. Related ideas can be combined together to form big ideas (or idea clusters). Then, using the criteria devised earlier, choose all of the ideas that broadly meet those criteria. We can implement several ideas in order to solve the challenge.

6. **Draw up an Action Plan**

Creative ideas may mean big changes or taking risks. Some of us love change and risk. Others are scared by it. Draw up an action plan with the simple steps you need to take in order to implement the ideas. Ideas that involve a lot work to implement can be particularly intimidating. Breaking their implementation down into a series of readily accomplished tasks makes these ideas easier to cope with and implement.

7. **Do it (Implement the Ideas)**

This is the simplest step of all. Take the action plan and implement the idea. And if the situation veers away from your action plan steps, then rewrite the action plan.

**Creative Problem Solving and innovation**

Systems and methods which are based on Creative Problem Solving, but in which creative challenges are poorly defined, also deliver poor results either because users do not understand the challenge or the problem is poorly understood and the resulting challenge stimulates ideas which in themselves are good, but which are not actually solutions to the true problem. Creative Problem Solving is a conceptually simple process – but critical to any innovative process.
A Clarion Theory on Creative Problem Solving

Psychological theories of Problem Solving have largely focused on explicit processes that gradually bring the solver closer to the solution step-by-step in a mostly explicit and deliberative way. This approach to Problem Solving is typically inefficient or ineffective when the problem is too complex. In such a case, a ‘creative’ approach to problem solving might be more appropriate. We propose a computational psychological model implementing the Explicit-Implicit Interaction theory of creative problem solving (i.e., the CLARION theory of Creative Problem Solving) that centers on the interaction of implicit and explicit processing. The model based on the CLARION theory has been used to simulate a variety of empirical psychological data sets. The model based on the CLARION theory is a four stage process. The first stage is preparation, which is the accumulation of knowledge that allows for directly solving the problem. The second stage is incubation. Because the solution often comes as a surprise to the solver, the stage following the incubation period was called illumination (or insight) which is the third stage. During this stage, the problem solver has the impression that the solution completely elucidates the problem. However, the quality of the solution remains to be evaluated by the fourth stage, i.e. the validation stage.

Creative Problem Solving Technique categories

Creative Problem Solving techniques can be categorized as follows:

- **Mental state shift**: Creativity techniques designed to shift a person's mental state into one that fosters creativity. These techniques are described in creativity techniques. One such popular technique is to take a break and relax or sleep after intensively trying to think of a solution.

- **Problem reframing**: Creativity techniques designed to reframe the problem and also can lead to useful insights.
• **Multiple idea facilitation**: Creativity techniques designed to increase the quantity of fresh ideas. This approach is based on the belief that a larger number of ideas increase the chances that one of them has value. Some of these techniques involve randomly selecting an idea, thinking about similarities with the undesired situation, and hopefully inspiring a related idea that leads to a solution. Such techniques are described in creativity techniques.

• **Inducing change of perspective**: Creative-problem-solving techniques designed to efficiently lead to a fresh perspective that causes a solution to become obvious. This category is especially useful for solving especially challenging problems. Some of these techniques involve identifying independent dimensions that differentiate closely associated concepts. Such techniques can overcome the mind's instinctive tendency to use "oversimplified associative thinking" in which two related concepts are so closely associated that their differences, and independence from one another, are overlooked.

**Application of Creative Problem Solving in Daily Life**

First clearly identify the problem. Next, gather data and formulate the challenge. Then, we can explore ideas and come up with solutions. Finally, develop a plan of action and make the solution a reality.
PERCEPTUAL SPEED

Concept of Perception

The world around us consists of various levels of physical energy. Our knowledge of the world comes through our sense organs, which react to these energies. The sense organs change the various environmental energies into nervous impulses, which go to the brain. Through the psychological process of perception, these patterns become known as objects, events, people and other aspects of the world. In the perception of shape, lies the beginning of concept formation. Whereas the optical image projected upon the retina is a mechanically complete recording of its physical counterpart, the corresponding visual percept or perception of shape is the grasping of structural features found in, or imposed upon, the stimulus material with templates of relatively simple
shape, which can be called visual concepts. Visual Perception is not a passive recording of stimulus material, but an active concern of the mind.

**Self Perception**

Individuals come to know their own attitude, emotions and other internal states partially by inferring them from observations of their own overt behavior and the circumstances in which this behavior occurs. Thus to the extent that internal cues are weak, ambiguous, or uninterruptable, the individual is functionally in the same position as an outside observer: an observer who must necessarily rely upon those same external cues to infer the individual’s inner state.

These two propositions constitute the heart of the authors self perception theory and accordingly, the central topic of this review. This attitude will track the conceptual antecedents and empirical consequences of these propositions, attempt to place the theory in a slight enlarged frame of reference, and hopefully, clarify just what phenomena the theory can and cannot account for in the rapidly growing experimental literature of self attribution phenomena.

**The self-perception postulates**

Many of the self descriptive statements which appear to be exclusively under the control of private stimuli may in fact still be partially controlled by the same accompanying public events used by the training community to infer the individual’s inner states in the first place.

A major theoretical issue on which psychologists are divided is the extent to which perception relies directly on the information present in the stimulus. Some argue that perceptual processes are not direct, but depend on the perceiver's expectations and previous knowledge as well as the information
available in the stimulus itself. This controversy is discussed with respect to Gibson (1966) who has proposed a direct theory of perception which is a 'bottom-up' theory, and Gregory (1970) who has proposed a constructivist (indirect) theory of perception which is a 'top down' theory.

Perceptual Speed refers to the rate of the power of act of perceiving. It reflects the speed of apprehension. The nature of thought, perception and learning are but some of the highly indefinable and abstract variables which contribute to our human ability to succeed, conquer and excel in the tasks which we encounter every day. The specific aspects of human mental abilities and multiplicity of human thought which define our level of intelligence have always been the point of discussion for psychologists. Perceptual speed is the ability to quickly and accurately compare letters, numbers, objects, pictures, or patterns. In tests of perceptual speed the things to be compared may be presented at the same time or one after the other.

Perceptual ability refers to special ability involved in perceiving the relevant details the speed and accuracy with which one grasps the details involved in a situation. etc., like rapid checking of sequences of words or numbers. Of the factors identified in factorial analysis of perception, two numbers have proved particularly fruitful in personality researches which are speed of closure and flexibility of closure. The first involves the rapid recognition of a familiar word. Object or other figure is a relatively unorganized or mutilated visual field. Flexibility of closure requires the identification of a figure amid distracting and confusing details. (Anastasi, 1968).

Perceptual speed is assessed by the speed of responding (usually on paper and pencil tests) with simple content in which everyone would be perfect if there were no time limits. Perceptual speed tasks often involve elementary
comparison, search, and substitution operations, with the test score consisting of the number of items correctly completed in the specified time.

**Theories of Perception**

Gibson (1966) proposed a direct theory of perception which is a 'bottom-up' theory, and Gregory (1970) proposed a constructivist (indirect) theory of perception which is a 'topdown' theory.

**Top-Down Approach**

He argued that between sensations and our conscious perception of the real world there must be intermediate processes. Such processes would be beyond the evidence of the senses. Perception is more than direct registration of sensations, but that other events intervene between stimulation and experience.

Psychologist Richard Gregory (1970) argued that perception is a constructive process which relies on top-down processing. Stimulus information from our environment is frequently ambiguous so to interpret it, we require higher cognitive information either from past experiences or stored knowledge in order to make inferences about what we perceive.

**Bottom-Up Approach**

Bottom-up processing is also known as data-driven processing, because perception begins with the stimulus itself. Processing is carried out in one direction from the retina to the visual cortex, with each successive stage in the visual pathway carrying out ever more complex analysis of the input.

Gibson’s bottom-up theory suggests that perception involves innate mechanisms forged by evolution and that no learning is required. This suggests that perception is necessary for survival – without perception we would live in a very dangerous environment. Our ancestors would have needed perception to escape from harmful predators, suggesting perception is evolutionary.
Perceptual Set

The concept of perceptual set is important to the active process of perception. Perceptual set is a tendency to perceive or notice some aspects of the available sensory data and ignore others.

Conclusion

This chapter outlines a description about the Instructional Strategy based on Path-Smoothing Model on Creative Problem Solving Ability, Perceptual Speed and Achievement in Mathematics. It is the duty of the teacher to ensure that the learning environment provided should be in accordance with the needs of the learner. The background of this Instructional strategy helped the investigator to form a strong basis for the study.